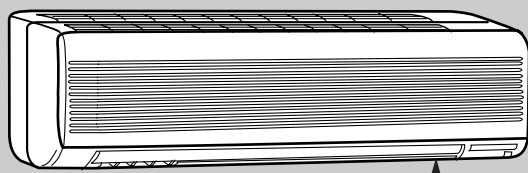


SERVICE MANUAL

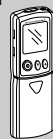
Wireless type Models

MS-A18WV	- [E1] (WH)
MS-A24WV	- [E1] (WH)
MS-A30WV	- [E1] (WH)



Indication of model name

MS-A18WV	- [E1]
MS-A24WV	- [E1]
MS-A30WV	- [E1]



CONTENTS

1. TECHNICAL CHANGES	2
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NOTE:

This service manual describes technical data of the indoor units.

As for outdoor units MU-A18WV-[E1], MU-A24WV-[E1] and MU-A30WV-[E1], refer to service manual OB326.



1

TECHNICAL CHANGES

MS-18RV -[E1]→MS-A18WV -[E1]

1. Indoor unit model has changed.
2. Rated voltage has changed. (220V-240V → 230V)
3. Remote controller has changed.
 - LONG MODE and WIDE MODE have been added.
4. Indoor fan motor has changed. (RA4V27-EF → RC4V32-AA)
5. Indoor heat exchanger has changed.
6. Diameter of connect pipe has changed. (Liquid: $\phi 8 \rightarrow \phi 6.35$)
7. Air filter has changed to catechin air filter.

MS-24RV -[E1]→MS-A24WV -[E1]

1. Indoor unit model has changed.
2. Rated voltage has changed. (220V-240V → 230V)
3. Remote controller has changed.
 - LONG MODE and WIDE MODE have been added.
4. Indoor fan motor has changed. (RA4V27-EE → RC4V32-AA)
5. Indoor heat exchanger has changed.
6. Diameter of connect pipe has changed. (Liquid: $\phi 8 \rightarrow \phi 6.35$)
7. Air filter has changed to catechin air filter.

MS-30RV -[E1]→MS-A30WV -[E1]

1. Diameter of connect pipe has changed. (Gas: $\phi 15.88 \rightarrow \phi 12$)
2. Rated voltage has changed. (220V-240V → 230V)
3. Power supply cord has been added.
4. Air filter has changed to catechin air filter.

2

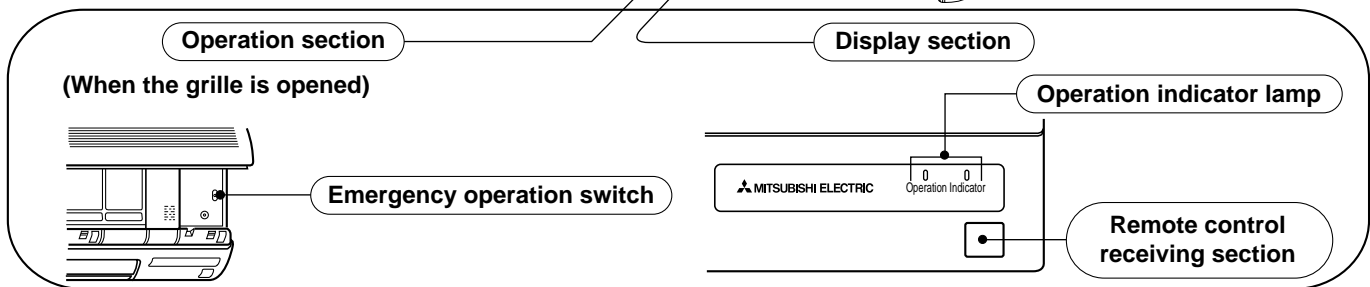
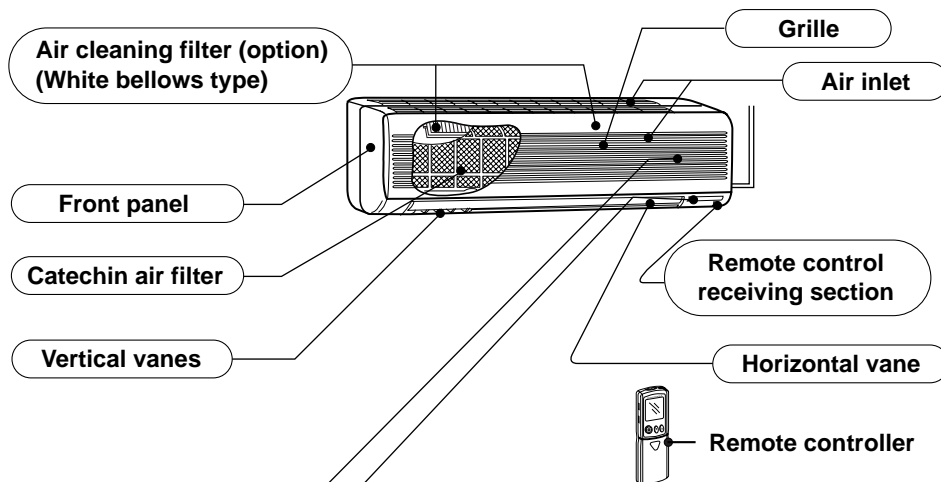
PART NAMES AND FUNCTIONS

INDOOR UNIT

MS-A18WV -[E1]

MS-A24WV -[E1]

MS-A30WV -[E1]



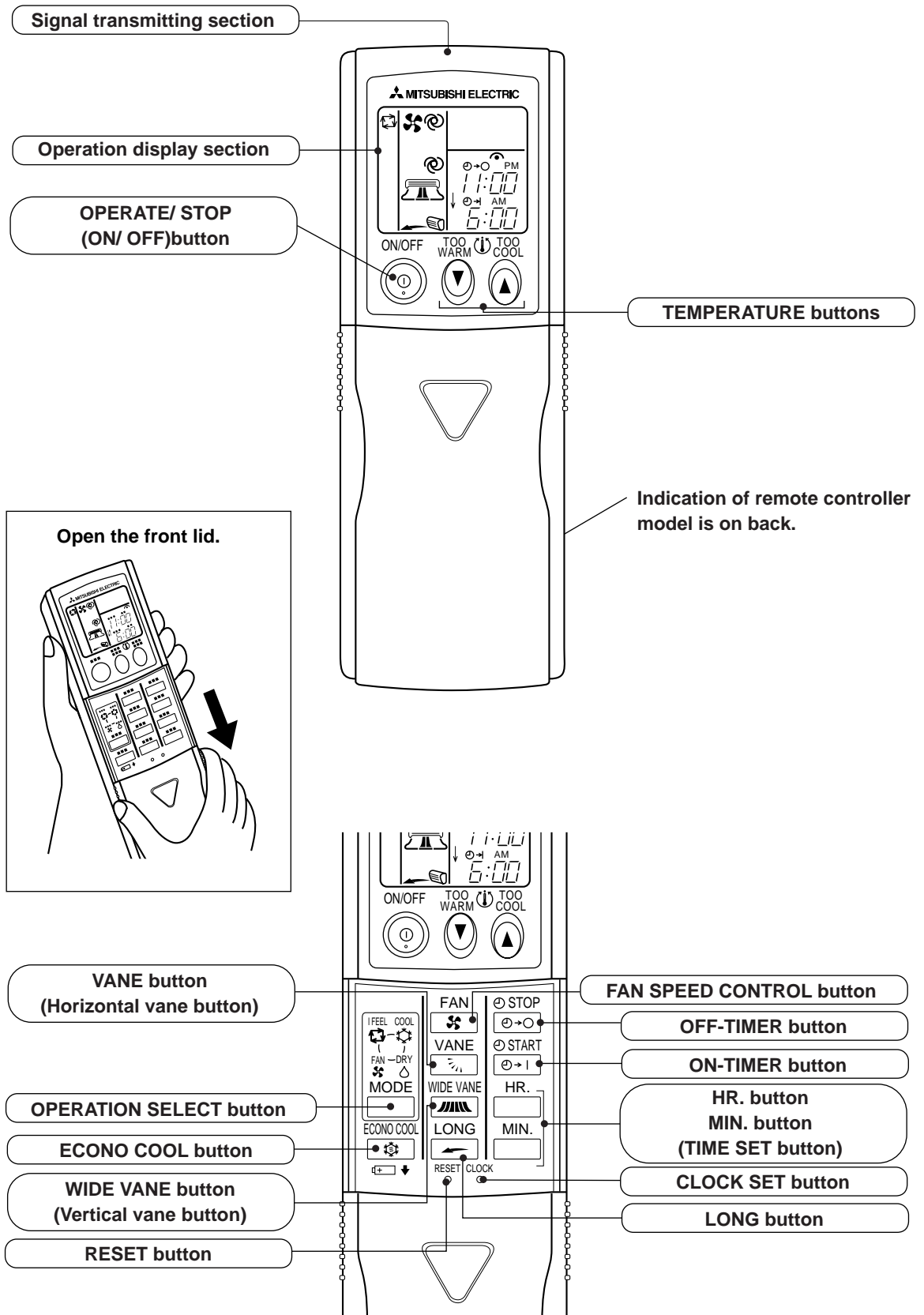
ACCESSORIES

Indoor unit

		MS-A18WV-[E1] MS-A24WV-[E1] MS-A30WV-[E1]
①	Installation plate	1
②	Installation plate fixing screw 4 × 25 mm	7
③	Remote controller holder	1
④	Fixing screw for ③ × 3.5 × 1.6 mm (Black)	2
⑤	Battery (AAA) for remote controller	2
⑥	Wireless remote controller	1
⑦	Felt tape (Used for left or left-rear piping)	1

REMOTE CONTROLLER

- MS-A18WV -E1
- MS-A24WV -E1
- MS-A30WV -E1



Indoor model			MS-A18WV - [E1]	MS-A24WV - [E1]
Function			Cooling	Cooling
Power supply			Single phase 230V, 50Hz	Single phase 230V, 50Hz
Capacity	Air flow(High/Med.*/Low*)	m ³ /h	768/642*/528*	768/672*/588*
Electrical data	Power outlet	A	10	10
	Running current	A	0.30	0.30
	Power input	W	60	60
	Auxiliary heater	A(kW)	—	—
	Power factor	%	87	87
	Fan motor current	A	0.30	0.30
Fan motor	Model		RC4V32-AA	RC4V32-AA
	Winding resistance(at20°C)	Ω	WHT-BLK 293 BLK-RED 146	WHT-BLK 293 BLK-RED 146
	Dimensions W×H×D	mm	1,100×325×227	1,100×325×227
	Weight	kg	16	16
Special remarks	Air direction		5	5
	Sound level(High/Med.*/Low*)	dB	42/38*/34*	45/41*/37*
	Fan speed(High/Med.*/Low*)	rpm	1,070/920*/780*	1,070/960*/850*
	Fan speed regulator		3	3
	Thermistor RT11(at25°C)	kΩ	10	10
	Thermistor RT12(at25°C)	kΩ	10	10
	Remote controller model		KP0B or KG1D	KP0B or KG1D

Indoor model			MS-A30WV - [E1]
Function			Cooling
Power supply			Single phase 230V, 50Hz
Capacity	Air flow(High/Med.*/Low*)	m ³ /h	960/822*/684*
Electrical data	Power outlet	A	10
	Running current	A	0.34
	Power input	W	69
	Auxiliary heater	A(kW)	—
	Power factor	%	88
	Fan motor current	A	0.34
Fan motor	Model		RC4V40-AA
	Winding resistance(at20°C)	Ω	WHT-BLK 138.2 BLK-RED 159.0
	Dimensions W×H×D	mm	1,100×325×227
	Weight	kg	16
Special remarks	Air direction		5
	Sound level(High/Med.*/Low*)	dB	47/42*/37*
	Fan speed(High/Med.*/Low*)	rpm	1,280/1,130*/970*
	Fan speed regulator		3
	Thermistor RT11(at25°C)	kΩ	10
	Thermistor RT12(at25°C)	kΩ	10
	Thermistor RT13(at25°C)	kΩ	10
	Remote controller model		KP0B or KG1D

NOTE: 1. Test conditions are based on JIS C 9612.

Cooling : Indoor DB27°C WB19°C

Outdoor DB35°C WB(24°C)

Indoor-Outdoor piping length 5m

2. Remote controller model KP0B and KG1D are the same in terms of specification.

* Reference value

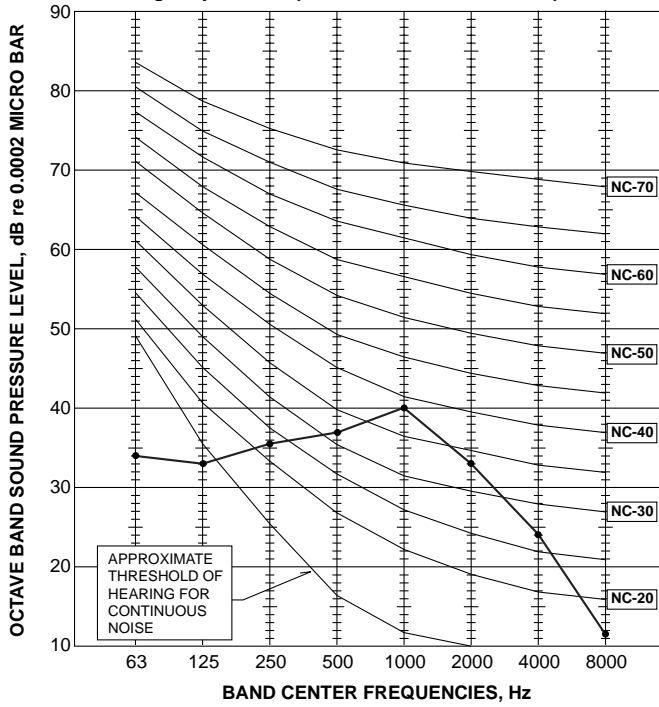
4

NOISE CRITERIA CURVES

MS-A18WV-E1

FAN SPEED	SPL(dB(A))	LINE
High	42	

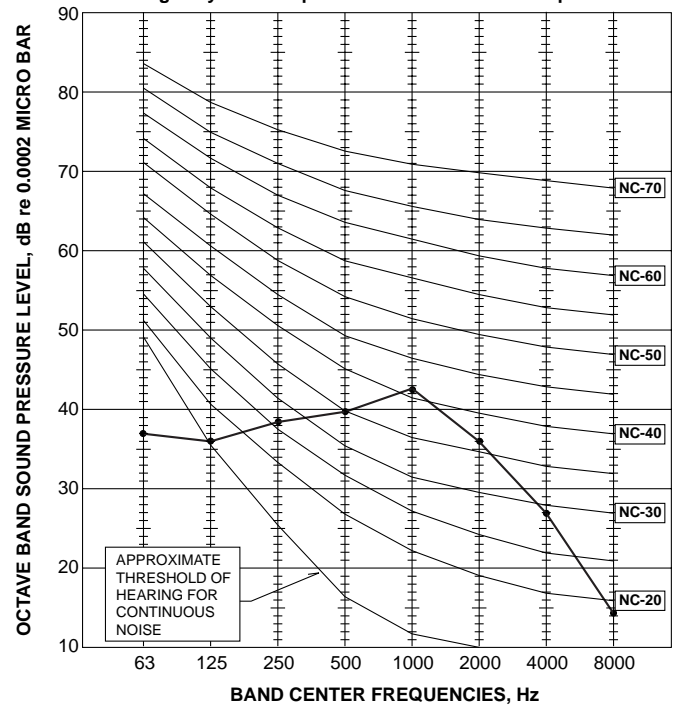
Test conditions,
Cooling : Dry-bulb temperature 27°C Wet-bulb temperature 19°C



MS-A24WV-E1

FAN SPEED	SPL(dB(A))	LINE
High	45	

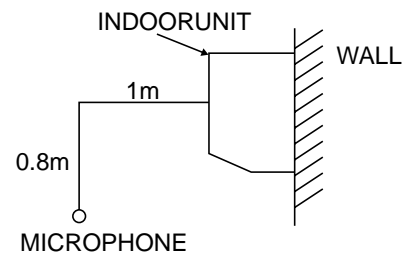
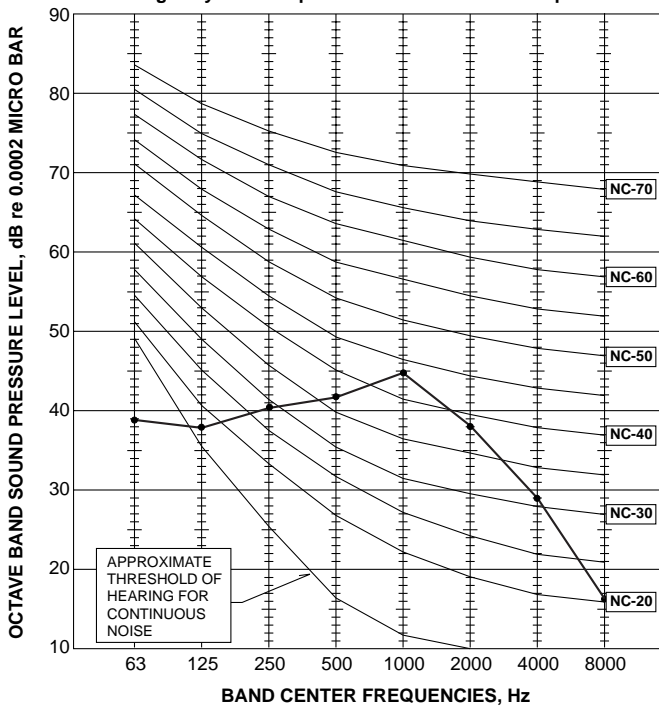
Test conditions,
Cooling : Dry-bulb temperature 27°C Wet-bulb temperature 19°C



MS-A30WV-E1

FAN SPEED	SPL(dB(A))	LINE
High	47	

Test conditions,
Cooling : Dry-bulb temperature 27°C Wet-bulb temperature 19°C



5

OUTLINES AND DIMENSIONS

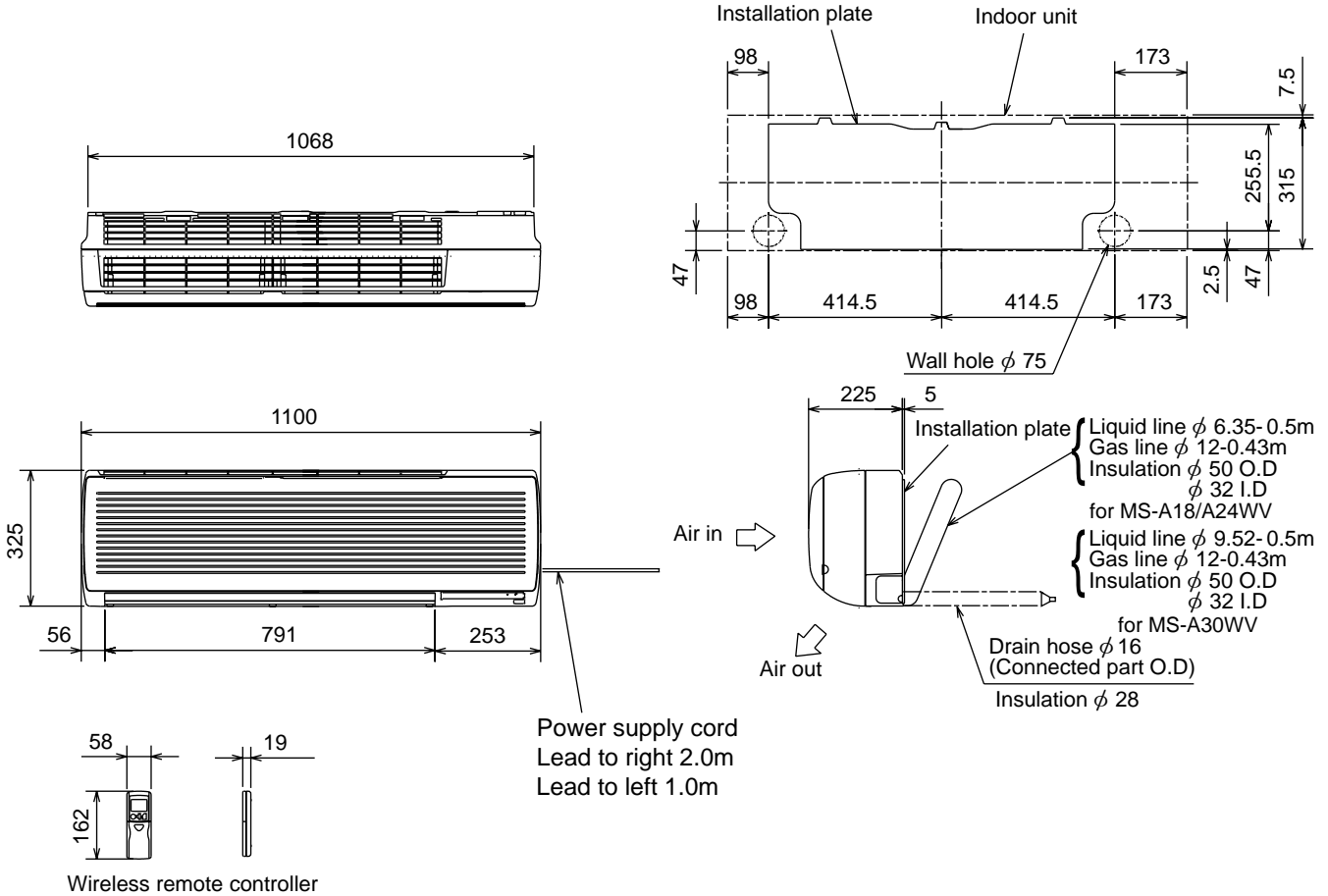
MS-A18WV -E1

MS-A24WV -E1

MS-A30WV -E1

Unit: mm

INDOOR UNIT

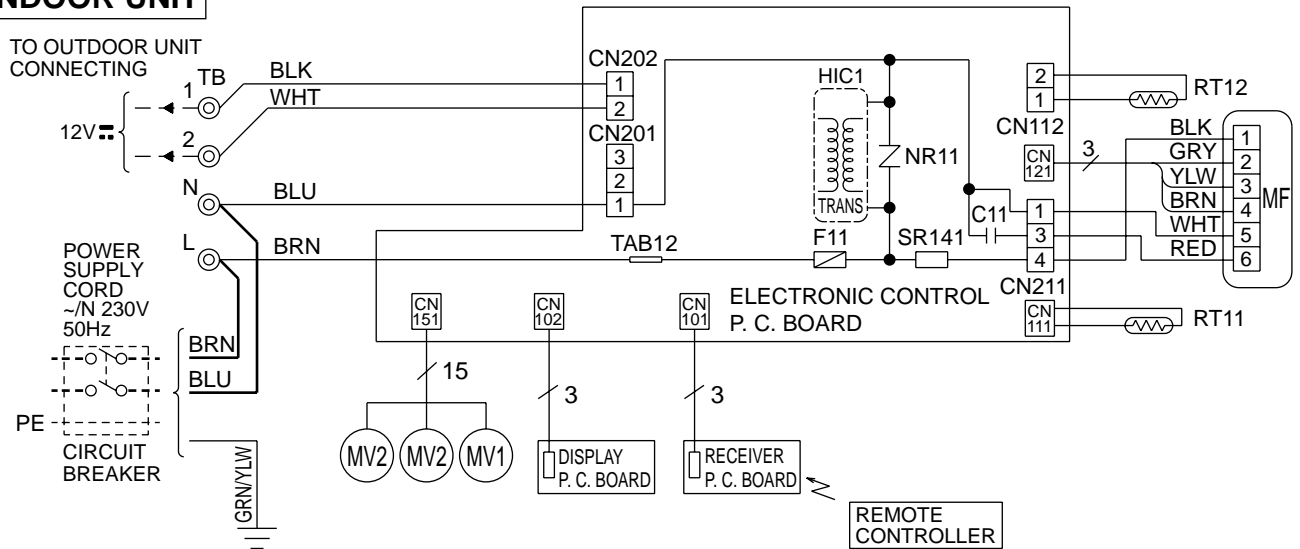


MS-A18WV -[E1]

MS-A24WV -[E1]

INDOOR UNIT

MODELS WIRING DIAGRAM



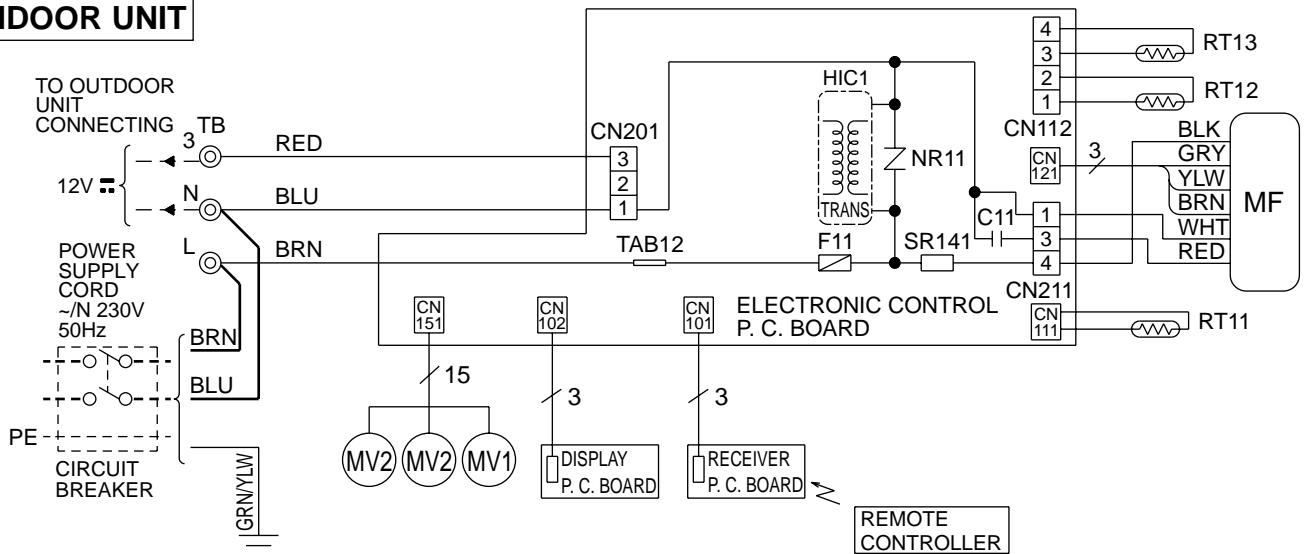
SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C11	INDOOR FAN CAPACITOR	MV1	VANE MOTOR (HORIZONTAL)	RT12	INDOOR COIL THERMISTOR
F11	FUSE (3.15A)	MV2	VANE MOTOR (VERTICAL)	SR141	SOLID STATE RELAY
HIC1	DC/DC CONVERTER	NR11	VARIATOR	TB	TERMINAL BLOCK
MF	INDOOR FAN MOTOR (INNER FUSE)	RT11	ROOM TEMPERATURE THERMISTOR		

- NOTES: 1.About the outdoor side electric wiring refer to the outdoor unit electric wiring diagram for servicing.
 2.Use copper conductors only. (For field wiring)
 3.Symbols below indicate.
 ◎ : Terminal block □□□□ : Connector

MS-A30WV -[E1]

INDOOR UNIT

MODEL WIRING DIAGRAM

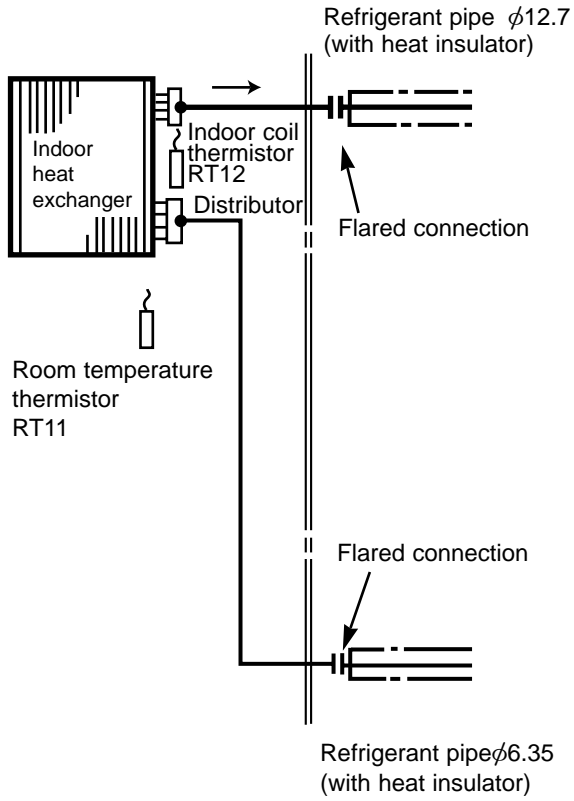


SYMBOL	NAME	SYMBOL	NAME	SYMBOL	NAME
C11	INDOOR FAN CAPACITOR	MV2	VANE MOTOR(VERTICAL)	SR141	SOLID STATE RELAY
F11	FUSE(3.15A)	NR11	VARIATOR	TB	TERMINAL BLOCK
HIC1	DC/DC CONVERTER	RT11	ROOM TEMPERATURE THERMISTOR		
MF	INDOOR FAN MOTOR(INNER PROTECTOR)	RT12	INDOOR COIL THERMISTOR (MAIN)		
MV1	VANE MOTOR(HORIZONTAL)	RT13	INDOOR COIL THERMISTOR (SUB)		

- NOTE:1. About the outdoor side electric wiring refer to the outdoor unit electric wiring diagram for servicing.
 2. Use copper conductors only. (For field wiring)
 3. Symbols below indicate.
 ◎ : Terminal block, □□□□ : Connector

MS-A18WV -E1

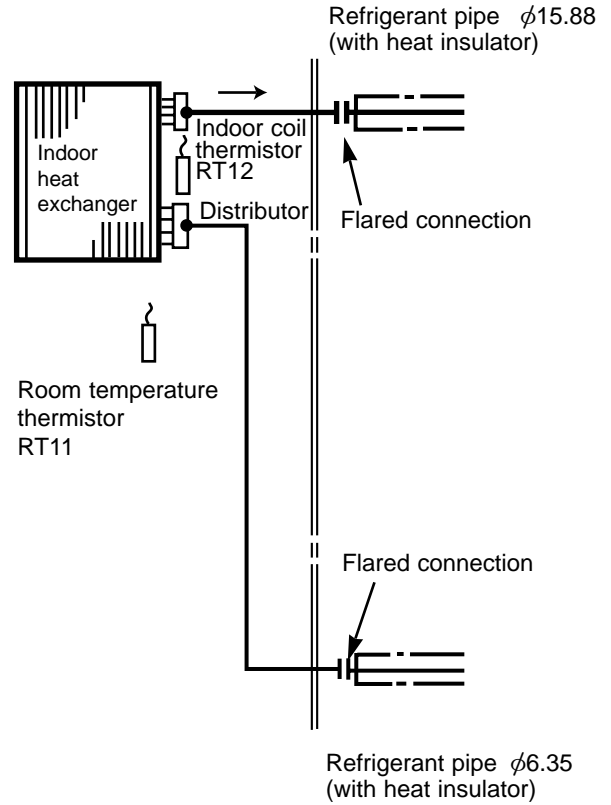
INDOOR UNIT



MS-A24WV -E1

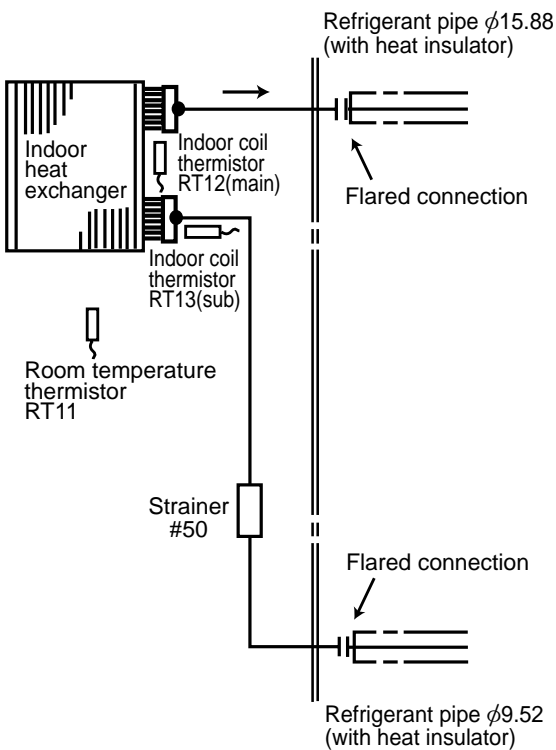
Unit:mm

INDOOR UNIT



MS-A30WV -E1

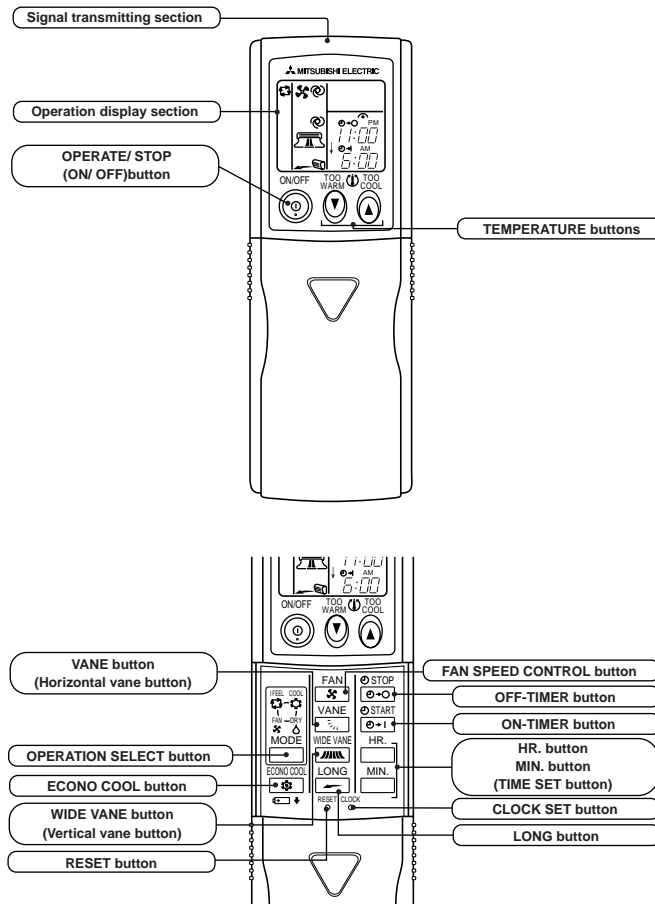
INDOOR UNIT



→ Refrigerant flow in cooling

MS-A18WV -[E1] MS-A24WV -[E1] MS-A30WV -[E1]

WIRELESS REMOTE CONTROLLER

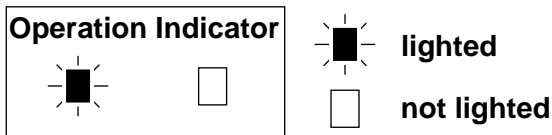


INDOOR UNIT DISPLAY SECTION

Operation Indicator lamp

The operation indicator at the right side of the indoor unit indicates the operation state.

- The following indication applies regardless of shape of the indicator.



Indication	Operation state	Difference between target temperature and room temperature
	This shows that the air conditioner is operating to reach the target temperature. Please wait until the target temperature is obtained.	Approx. 2 °C or more
	This shows that the room temperature is approaching the target temperature.	Approx. 2 °C or less

Once the operation mode are set, the same operation mode can be repeated by simply turning the OPERATE/STOP (ON/OFF) button ON.

Indoor unit receives the signal with a beep tone.

When the system turns off, 3-minute time delay will operate to protect system from overload and compressor will not restart for 3 minutes.

8-1. "I FEEL CONTROL" () OPERATION

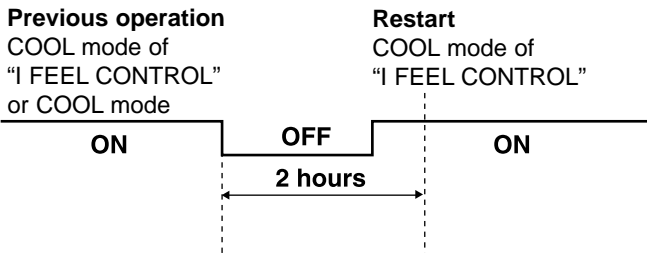
- Press OPERATE/STOP (ON/OFF) button on the remote controller. OPERATION INDICATOR lamp of the indoor unit turns on with a beep tone.
- Select "I FEEL CONTROL" mode with the OPERATION SELECT button.
- The operation mode is determined by the room temperature at start-up of the operation.

Initial room temperature	Mode
25°C or more	COOL mode of "I FEEL CONTROL"
more than 13°C , less than 25°C	DRY mode of "I FEEL CONTROL"

- Once the mode is fixed, the mode does not change by room temperature afterwards.
- Under the ON-TIMER (⊖→|) operation, mode is determined according to the room temperature at the set time the operation starts.
- When the system is stopped on the remote controller, and restarted within 2 hours in "I FEEL CONTROL" (□) mode, the system operates in previous mode automatically regardless of the room temperature.

Operation timer chart

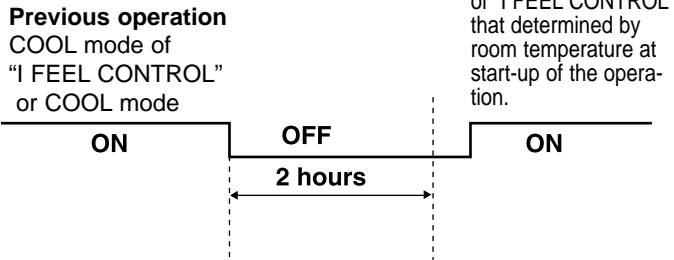
Example



When the system is restarted after 2 hours and more, the operation mode is determined by the room temperature at start-up of the operation.

Operation timer chart

Example



(4) The initial set temperature is decided by the initial room temperature.

Model	Initial room temperature	Initial set temperature	
COOL mode of "I FEEL CONTROL"	26°C or more	24°C	*1
	25°C to 26°C	Initial room temperature minus 2°C	
DRY mode of "I FEEL CONTROL"	more than 13°C, less than 25°C	Initial room temperature minus 2°C	


*1 When the system is restarted with the remote controller, the system operates with the previous set temperature regardless of room temperature at restart.
The set temperature is calculated by the previous set temperature.


(5) TEMPERATURE buttons

In "I FEEL CONTROL" (□) mode, set temperature is decided by the microprocessor based on the room temperature. In addition, set temperature can be controlled by TOO WARM or TOO COOL buttons when you feel too cool or too warm. Each time the TOO WARM or TOO COOL button is pressed, the indoor unit receives the signal and emits a beep tone.

• **Fuzzy control**

When the TOO COOL or TOO WARM button is pressed, the microprocessor changes the set temperature, considering the room temperature, the frequency of pressing TOO COOL or TOO WARM button and the user's preference to heat or cool. So this is called "Fuzzy control", and works only in "I FEEL CONTROL" mode.
In DRY mode of "I FEEL CONTROL", the set temperature doesn't change.

 ... To raise the set temperature 1~2 degrees(°C)

 ... To lower the set temperature 1~2 degrees(°C)

8-1-1. COOL mode of “I FEEL CONTROL”

1. Indoor fan speed control

Indoor fan operates at the set speed by FAN SPEED CONTROL button.
 In AUTO the fan speed is as follows.

Initial temperature difference	Fan Speed
Room temperature minus set temperature : 1.7 degrees or more.....	High
Room temperature minus set temperature : Between 1 and 1.7 degrees.....	Med.
Room temperature minus set temperature : less than 1 degree.....	Low

2. Coil frost prevention

① Temperature control

When the indoor coil thermistor RT12 reads 0°C or below (MS-A18WV) / 3°C or below (MS-A24WV) / RT12 or RT13 reads -1°C or below (MS-A30WV), the coil frost prevention mode starts immediately.

However, the coil frost prevention doesn't work for 5 minutes since the compressor has started.

The indoor fan operates at the set speed and the compressor stops for 5 minutes.

After that, if RT12 still reads below 0°C (MS-A18WV) / 3°C (MS-A24WV) / RT12 or RT13 still reads below -1°C (MS-A30WV) this mode prolonged until the RT12 reads over 0°C (MS-A18WV) / 3°C (MS-A24WV) / RT12 or RT13 still reads over -1°C (MS-A30WV).

② Time control

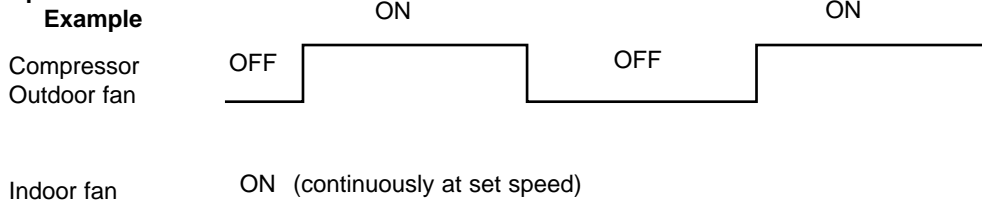
When the three conditions as follows have been satisfied for 1 hour and 45 minutes, compressor stops for 3 minutes.

- a. Compressor has been continuously operating.
- b. Indoor fan speed is Low or Med.
- c. Room temperature is below 26°C.

When compressor stops, the accumulated time is cancelled and when compressor restarts, time counting starts from the beginning.

Time counting also stops temporarily when the indoor fan speed becomes High or the room temperature exceeds 26°C. However, when two of the above conditions (b. and c.) are satisfied again. Time accumulation is resumed.

Operation chart



NOTE : As for outdoor fan speed control and discharge temperature protection, refer to service manual for outdoor unit.

8-1-2. DRY mode of “I FEEL CONTROL”

The system for dry operation uses the same refrigerant circuit as the cooling circuit.

The compressor and the indoor fan are controlled by the room temperature.

By such controls, indoor flow amounts will be reduced in order to lower humidity without much room temperature decrease.

1. Indoor fan speed control

Indoor fan operates at the set speed by FAN SPEED CONTROL button.

However, in AUTO fan operation, fan speed becomes Low.

2. The operation of the compressor and indoor/ outdoor fan

Compressor operates by room temperature control and time control.

Set temperature is controlled to fall 2°C from initial room temperature.

Indoor fan and outdoor fan operate in the same cycle as the compressor.

- When the room temperature is 23°C or over:

When the thermostat is ON, the compressor repeats 8 minutes ON and 3 minutes OFF.

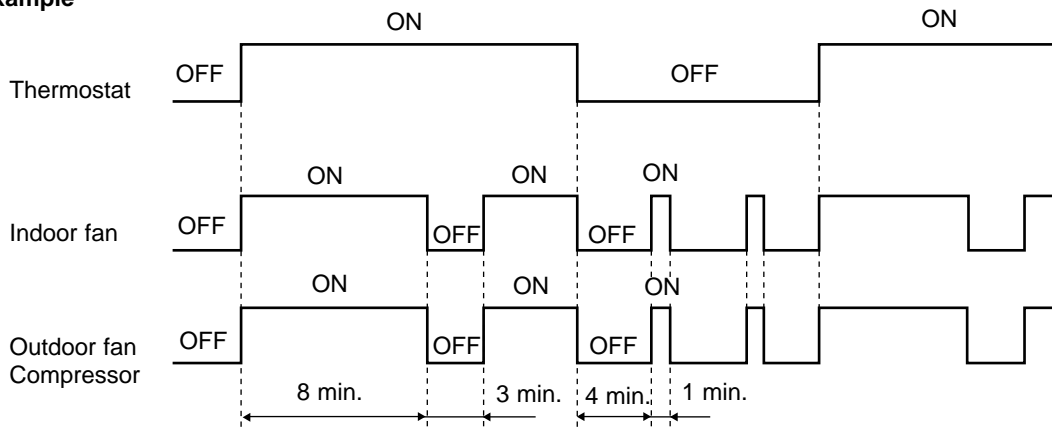
When the thermostat is OFF, the compressor repeats 4 minutes OFF and 1 minute ON.

- When the room temperature is under 23°C.

When the thermostat is ON, the compressor repeats 2 minutes ON and 3 minutes OFF.

When the thermostat is OFF, the compressor repeats 4 minutes OFF and 1 minute ON.

Operation time chart
Example



3. Coil frost prevention

- The operation is as same as coil frost prevention during COOL mode of "I FEEL CONTROL".
- Indoor fan operates at the set speed and the compressor stops for 5 minutes, because protection(Coil frost prevention) has the priority.

However, when coil frost prevention works while the compressor is not operating, it's speed becomes Low.

NOTE : As for outdoor fan speed control, refer to service manual for outdoor unit.

8-2. COOL (❄) OPERATION

- (1) Press OPERATE/STOP (ON/OFF) button.
OPERATION INDICATOR lamp of the indoor unit turns on with a beep tone.

- (2) Select COOL mode with the OPERATION SELECT button.

- (3) Press the TEMPERATURE buttons. (TOO WARM or TOO COOL button) to select the desired temperature.

The setting range is 16 ~ 31°C.

* Indoor fan continues to operate regardless of thermostat's OFF-ON at set speed.

* Coil frost prevention is as same as COOL mode of "I FEEL CONTROL".

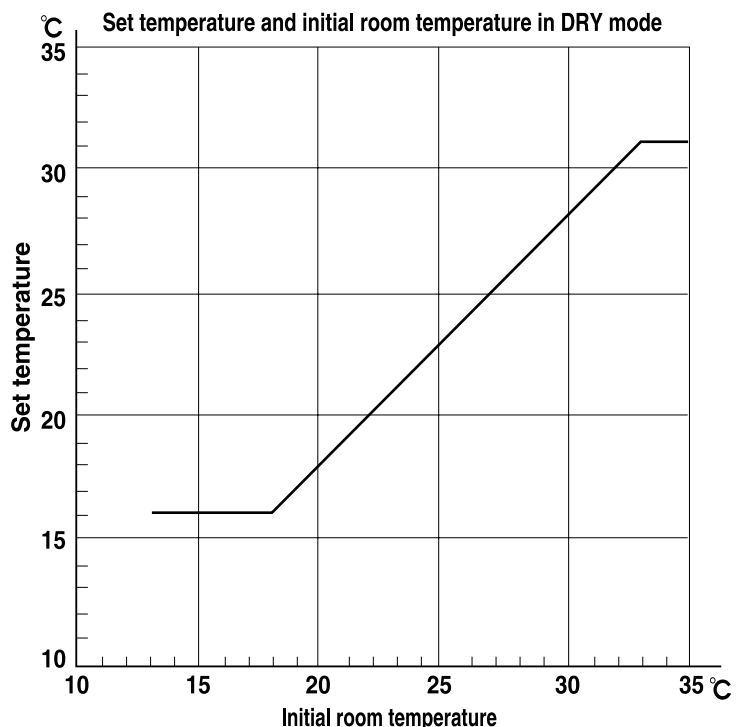
8-3. DRY (☹) OPERATION

- (1) Press OPERATE/STOP (ON/OFF) button.
OPERATION INDICATOR lamp of the indoor unit turns on with a beep tone.

- (2) Select DRY mode with the OPERATION SELECT button.

- (3) The microprocessor reads the room temperature and determines the set temperature. Set temperature is as shown on the right chart. Thermostat (SET TEMP.) does not work. The other operations are same as DRY mode of "I FEEL CONTROL".

- (4) DRY operation will not function when the room temperature is 13°C or below.



8-4. FAN (🌀) OPERATION

- (1) Press OPERATE/STOP(ON/OFF) button.
OPERATION INDICATOR lamp of the indoor unit turns ON with a beep tone.

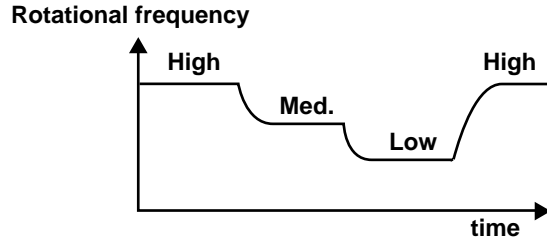
- (2) Select FAN mode with the OPERATION SELECT button.

- (3) Select the desired fan speed. When AUTO, it becomes Low.
Only indoor fan operates. Outdoor unit does not operate.

8-5. INDOOR FAN MOTOR CONTROL

(1) Rotational frequency feedback control

The indoor fan motor is equipped with a rotational frequency sensor, and outputs signal to the microprocessor to feedback the rotational frequency. Comparing the current rotational frequency with the target rotational frequency (High, Med., Low), the microprocessor controls SR141 and adjusts fan motor electric current to make the current rotational frequency close to the target rotational frequency. With this control, when the fan speed is switched, the rotational frequency changes smoothly.



(2) Fan motor lock-up protection

When the rotational frequency feedback signal has not output for 12 seconds, (or when the microprocessor cannot detect the signal for 12 seconds) the fan motor is regarded locked-up. Then the electric current to the fan motor is shut off. 3 minutes later, the electric current is applied to the fan motor again. During the fan motor lock-up, the OPERATION INDICATOR Indicator lamp flashes on and off to show the fan motor abnormality. (Refer to page 21.)

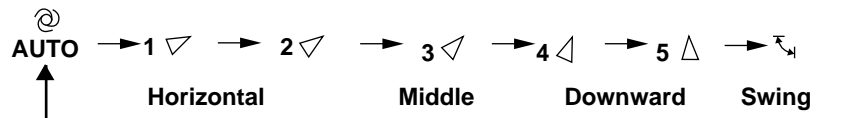
8-6. AUTO VANE OPERATION

1. Horizontal vane

(1) Vane motor drive

These models are equipped with a stepping motor for the horizontal vane. The rotating direction, speed, and angle of the motor are controlled by pulse signals (approx. 12V) transmitted from indoor microprocessor.

(2) The horizontal vane angle and mode changes as follows by pressing the VANE button.



(3) Positioning

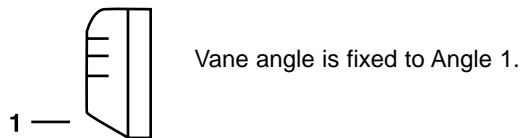
The vane is once pressed to the vane stopper below to confirm the standard position and then set to the desired angle. Confirming of standard position is performed in case of follows.

- When the OPERATE/STOP (ON/OFF) button is pressed. (POWER ON/OFF)
- When the vane control is changed from AUTO to MANUAL.
- When the SWING is finished.
- When the test run starts.
- When the power supply turns ON.

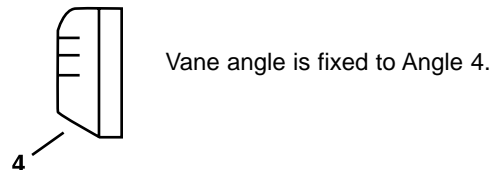
(4) VANE AUTO (@) mode

In VANE AUTO mode, the microprocessor automatically determines the horizontal vane angle and operation to make the optimum room-temperature distribution.

- In COOL and DRY operation



- In FAN operation



(5) STOP (operation OFF) and ON-TIMER standby.

When the following cases occur, the horizontal vane returns to the closed position.


- When the OPERATE/STOP (ON/OFF) button is pressed (POWER OFF).
- When the operation is stopped by the emergency operation.
- When the ON-TIMER is on standby.

(6) Dew prevention

During COOL or DRY operation at Vane Angle 4 or 5 when the compressor cumulative operation time of compressor exceeds 1 hour, the vane angle automatically changes to Angle 1 for dew prevention.

(7) SWING MODE (ㄥ)

By selecting SWING mode with the VANE button, the horizontal vane swings vertically. The remote controller displays “ ㄥ ”.

(8) ECONO COOL () operation (ECONOMical operation)

When the ECONO COOL button is pressed in COOL mode, set temperature is automatically set 2°C higher than that in COOL mode.

Also the horizontal vane swings in various cycle according to the temperature of indoor heat exchanger(Tp(* 1)).

SWING operation makes you feel cooler than set temperature. So, even though the set temperature is higher than that in COOL mode, the air conditioner can keep comfort. As a result, energy can be saved.

ECONO COOL operation is cancelled when the ECONO COOL button is pressed once again or VANE button is pressed or LONG button is pressed or change to other operation mode.

NOTE : ECONO COOL operation does not work in COOL mode of "I FEEL CONTROL".

SWING operation

* 1 Tp : • Value of RT12 (MS-A18/A24WV)

• Minimum value of indoor coil thermistor (main) RT12 and indoor coil thermistor (sub) RT13 (MS-A30WV)

In swing operation of ECONO COOL operation mode, the initial air flow direction is adjusted to "Horizontal".

According to the temperature of indoor coil thermistor Tp(* 1) at starting of this operation, next downward blow time is decided. Then when the downward blow has been finished, next horizontal blow time is decided.


For initial 10 minutes the swing operation is performed in table G~H for quick cooling.


Also, after 10 minutes when the difference of set temperature and room temperature is more than 2°C, the swing operation is performed in table D~H for more cooling.

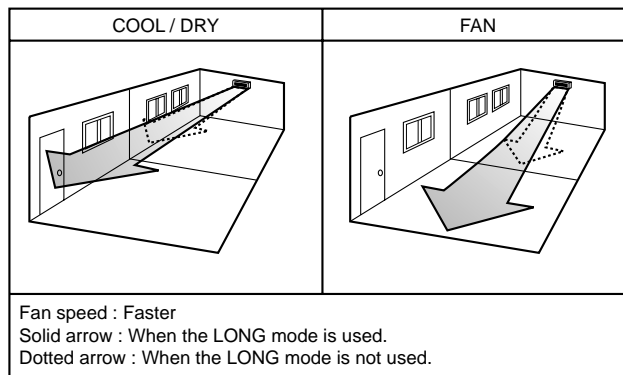
The air conditioner repeats the swing operation in various cycle as follows.

	Temperature of Tp(* 1)	Downward blow time (sec.)	Horizontal blow time (sec.)
A	15°C or less	2	23
B	15°C to 17°C	5	20
C	17°C to 18°C	8	17
D	18°C to 20°C	11	14
E	20°C to 21°C	14	11
F	21°C to 22°C	17	8
G	22°C to 24°C	20	5
H	more than 24°C	23	2

(9) LONG MODE ()

By pressing the LONG button indoor fan speed becomes faster than setting fan speed on the remote controller, and the horizontal vane moves to the position for LONG mode. The remote controller displays "  ". LONG mode is cancelled when the LONG button is pressed once again or the VANE button is pressed or ECONO COOL button is pressed in COOL mode.

• In the following example, the vertical vane is set to  (front.).

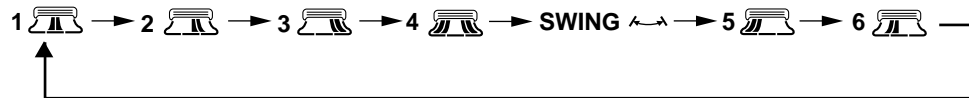


2. Vertical vane

(1) Vane motor drive

These models are equipped with a stepping motor for the vertical vane. The rotating direction, speed, and angle of the motor are controlled by pulse signals (approx. 12V) transmitted from microprocessor.

(2) The vertical vane angle and mode change as follows by pressing the WIDE VANE button.



(3) Positioning

The vane is once pressed to the vane stopper to confirm the standard position and then set to the desired angle. Confirming of standard position is performed in case of follows.

(a) When the OPERATE/STOP(ON/OFF) button is pressed (POWER ON/OFF).

(b) When the SWING is started or finished.

(c) When the power supply turns ON.

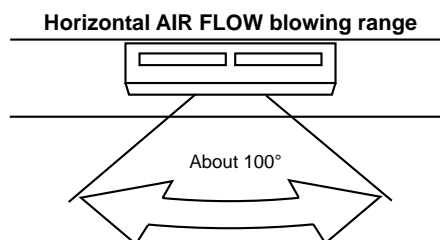
(4) SWING MODE (↔)

By selecting SWING mode with the WIDE VANE button, the vertical vane swings horizontally. The remote controller displays “↔”. The vane moves right and left in the width of Angle 4 repeatedly.

(5) WIDE MODE (🌀)

By selecting WIDE mode with the WIDE VANE button, indoor fan speed becomes faster than setting fan speed on the remote controller (*). The remote controller displays “🌀”.

* Indoor fan speed becomes faster than setting fan speed on the remote controller even when 🌀 or 🌀 is selected.



8-7. TIMER OPERATION

1. How to set the timer

(1) Press OPERATE/STOP (ON/OFF) button to start the air conditioner.

(2) Check that the current time is set correctly.

NOTE : Timer operation will not work without setting the current time. Initially “AM0:00” blinks at the current time display of TIME MONITOR, so set the current time correctly with CLOCK SET button.

(3) Press ON/OFF TIMER buttons to select the operation.

“ON-TIMER” button... AUTO START operation (ON timer)

“OFF-TIMER” button... AUTO STOP operation (OFF timer)

(4) Press HR. and MIN. button to set the timer. Time setting is 10-minute units.

HR. and MIN. button will work when “⊖→|” or “⊖→○” mark is flashing.

These marks disappear in 1 minute.

After setting the ON timer, check that OPERATION INDICATOR lamp of the indoor unit lights.

NOTE1 : Be sure to place the remote controller at the position where its signal can reach the air conditioner even during TIMER operation, or the set time may deviate within the range of about 10 minutes.

NOTE2 : Reset the timer in the following cases, or the set time may deviate and other malfunctions may occur.

- A power failure occurs.
- The circuit breaker functions.

2. Cancel

TIMER setting can be cancelled with the ON/OFF TIMER buttons.

To cancel the ON timer, press the "ON-TIMER" button.

To cancel the OFF timer, press the "OFF-TIMER" button.

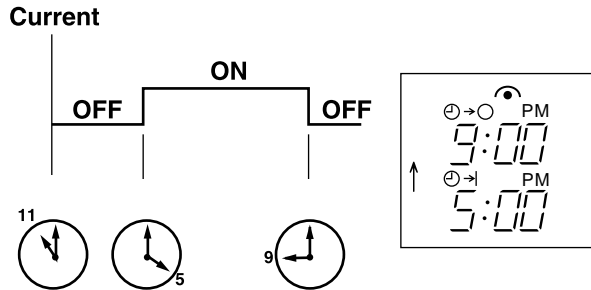
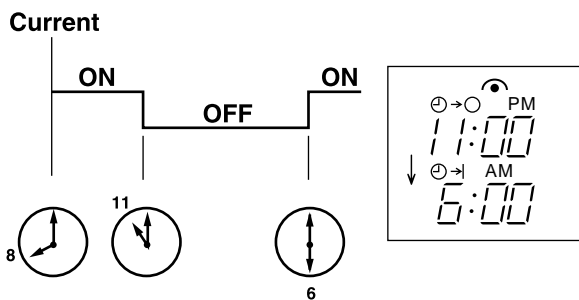
TIMER is cancelled and the display of set time disappears.

PROGRAM TIMER

- The OFF timer and ON timer can be used in combination.
- "↑" and "↓" display shows the order of the OFF timer and ON timer operation.

(Example 1) The current time is 8:00 PM.
The unit turns off at 11:00 PM, and on at 6:00 AM.

(Example 2) The current time is 11:00 AM.
The unit turns on at 5:00 PM, and off at 9:00 PM.



NOTE : TIMER setting will be cancelled by power failure or breaker functioning.

8-8. EMERGENCY-TEST OPERATION

In case of test run operation or emergency operation, use the EMERGENCY OPERATION switch on the front of the indoor unit. Emergency operation is available when the remote controller is missing, has failed or the batteries of remote controller run down. The unit will start and the OPERATION INDICATOR lamp will light.

The first 30 minutes of operation is the test run operation. This operation is for servicing. The indoor fan speed runs at High speed and the system is in continuous operation. (The thermostat is ON.)

After 30 minutes of test run operation the system shifts to EMERGENCY COOL MODE with a set temperature of 24°C. The fan speed shifts to Med. speed.

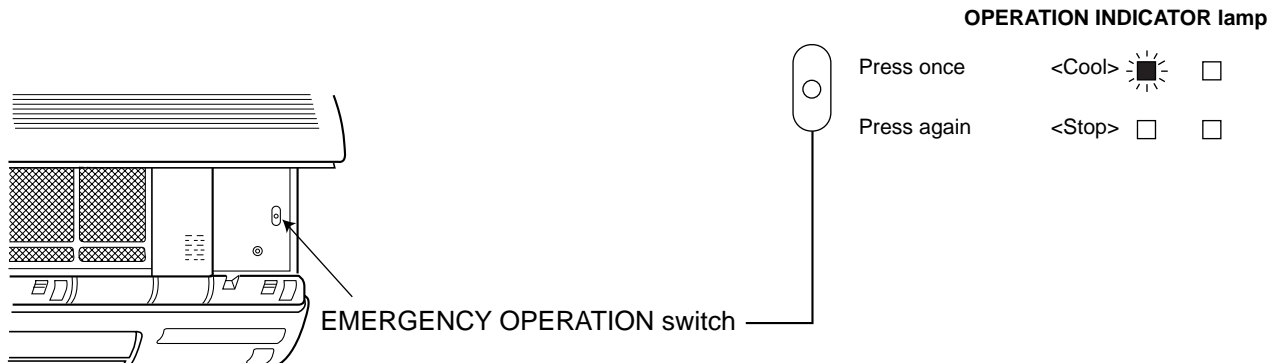
The coil frost prevention works even in emergency operation.

In the test run or emergency operation, the horizontal vane operates in VANE AUTO (@) mode.

Emergency operation continues until the EMERGENCY OPERATION switch is pressed again or the unit receives any signal from the remote controller. In case of latter normal operation will start.

NOTE : Do not press the EMERGENCY OPERATION switch during normal operation.

- The following indication applies regardless of shape of the indicator.



MS-A18WV -E1

MS-A24WV -E1

MS-A30WV -E1

9-1. TIMER SHORT MODE

For service, set time can be shortened by short circuit of JPG and JPS on the electronic control P.C. board.

The time will be shortened as follows.

Set time : 1 minute → 1-second

Set time : 3 minute → 3-second (It takes 3 minutes for the compressor to start operation. However, the starting time is shortened by short circuit of JPG and JPS.)

9-2. P.C. BOARD MODIFICATION FOR INDIVIDUAL OPERATION

A maximum of 4 indoor units with wireless remote controllers can be used in a room.

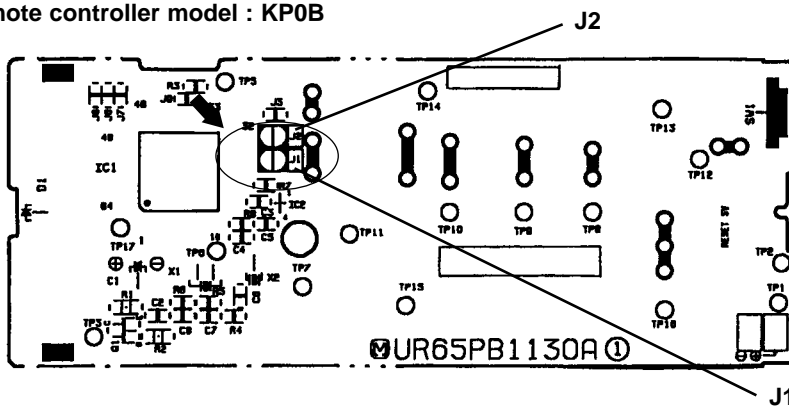
In this case, to operate each indoor unit individually by each remote controller, P.C. boards of remote controller must be modified according to the number of the indoor unit.

How to modify the remote controller P.C. board

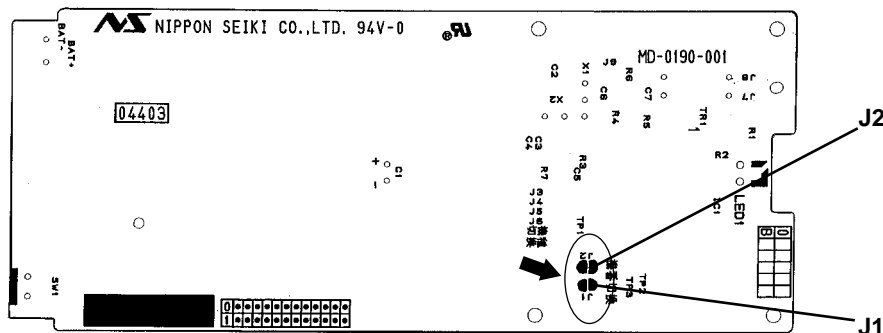
Remove batteries before modification.

The board has a print as shown below :

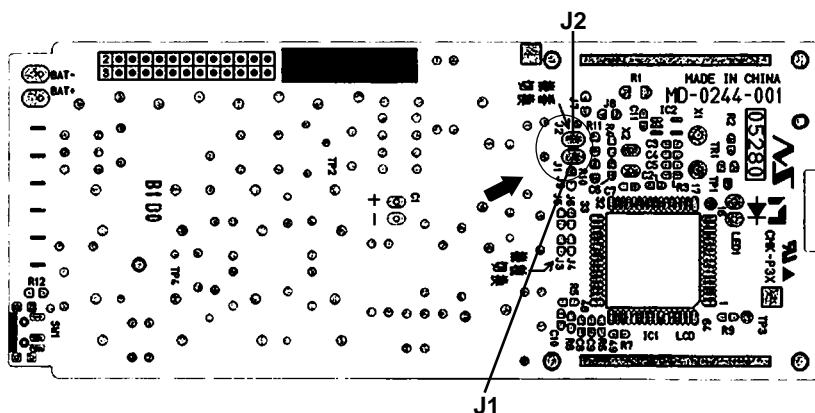
Remote controller model : KP0B



Remote controller model : KG1D



Remote controller model : KG1D



- NOTE :** 1. For remodelling, take out the batteries and press the OPERATE/STOP(ON/OFF) button twice or 3 times at first. After finish remodelling, put back the batteries then press the RESET button.
2. Remote controller model KG1D and KP0B are the same in terms of specification.

The P.C. board has the print "J1" and "J2". Solder "J1" and "J2" according to the number of indoor unit as shown in Table 1. After modification, press the RESET button.

Table 1

	1 unit operation	2 units operation	3 units operation	4 units operation
No. 1 unit	No modification	Same as at left	Same as at left	Same as at left
No. 2 unit	–	Solder J1	Same as at left	Same as at left
No. 3 unit	–	–	Solder J2	Same as at left
No. 4 unit	–	–	–	Solder both J1 and J2

How to set the remote controller exclusively for particular indoor unit

After you turn the breaker ON, the first remote controller that sends the signal to the indoor unit will be regarded as the remote controller for the indoor unit.

The indoor unit will only accept the signal from the remote controller that has been assigned to the indoor unit once they are set. The setting will be cancelled if the breaker has turned off, or the power supply has shut down.

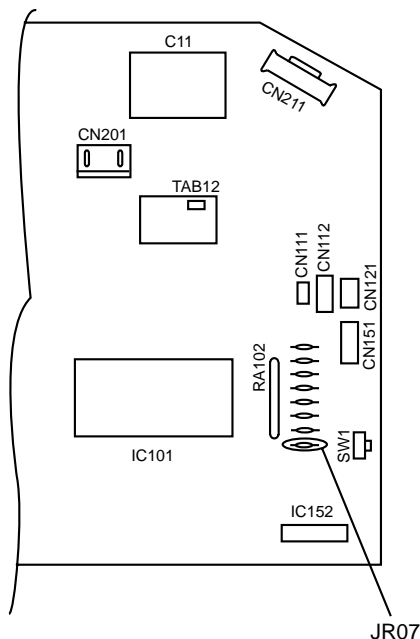
Please conduct the above setting once again after the power has restored.

9-3. AUTO RESTART FUNCTION

When the indoor unit is controlled with the remote controller, the operation mode, set temperature, and the fan speed are memorized by the indoor electronic control P.C.board. The “AUTO RESTART FUNCTION” sets to work the moment power has restored after power failure. Then, the unit will restart automatically. However if the unit is operated in “I FEEL CONTROL” mode before power failure, the operation is not memorized. In “I FEEL CONTROL” mode, the operation is decided by the initial room temperature.

How to release “AUTO RESTART FUNCTION”

- ① Turn off the main power for the unit.
- ② Pull out the electronic control P.C. board, the receiver P.C. board and the display P.C. board. (Refer to page 27.)
- ③ Solder jumper wire to the RESISTOR JR07 on the indoor electronic control P.C. board. (Refer to page 26.)



Operation

- ① If the main power (230V AC) has been cut, the operation settings remain.
- ② After the power is restored, the unit restarts automatically according to the memory. (However, it takes at least 3 minutes for the compressor to start running.)

NOTE

- The operation settings are memorized when 10 seconds have passed after the remote controller was operated with the remote controller.
- If main power is turned off or a power failure occurs while AUTO START/STOP timer is active, the timer setting is cancelled.
- If the unit has been off with the remote controller before power failure, the auto restart function does not work as the power button of the remote controller is off.
- To prevent breaker off due to the rush of starting current, systematize other home appliances not to turn on at the same time.
- When some air conditioners are connected to the same supply system, if they are operated before power failure, the starting current of all the compressors may flow simultaneously at restart. Therefore, the special counter-measures are required to prevent the main voltage-drop or the rush of the starting current by adding to the system that allows the units to start one by one.

MS-A18WV -E1

MS-A24WV -E1

MS-A30WV -E1

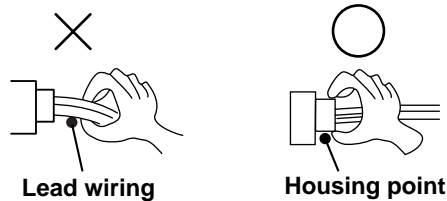
10-1. Cautions on troubleshooting

1. Before troubleshooting, check the following:

- (1) Check the power supply voltage.
- (2) Check the indoor/outdoor connecting wire for mis-wiring.

2. Take care the following during servicing.

- (1) Before servicing the air conditioner, be sure to first turn off the remote controller to stop the main unit, and then after confirming the horizontal vane is closed, turn off the breaker and / or disconnect the power plug.
- (2) Be sure to turn OFF the power supply before removing the front panel, the cabinet, the top panel, and the electronic control P.C. board.
- (3) When removing the electronic control P.C. board, hold the edge of the board with care NOT to apply stress on the components.
- (4) When connecting or disconnecting the connectors, hold the housing of the connector. DO NOT pull the lead wires.



3. Troubleshooting procedure

- (1) First, check if the OPERATION INDICATOR lamp on the indoor unit is flashing on and off to indicate an abnormality. To make sure, check how many times the abnormality indication is flashing on and off before starting service work.
- (2) Before servicing check that the connector and terminal are connected properly.
- (3) If the electronic control P.C. board is supposed to be defective, check the copper foil pattern for disconnection and the components for bursting and discolouration.
- (4) When troubleshooting, refer to the flow chart on page 20 and the check table on page 21.

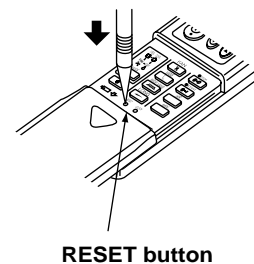
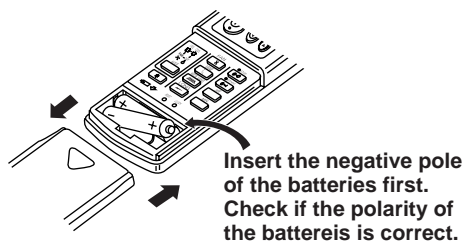
4. How to replace batteries

Weak batteries may cause the remote controller malfunction.

In this case, replace the batteries to operate the remote controller normally.

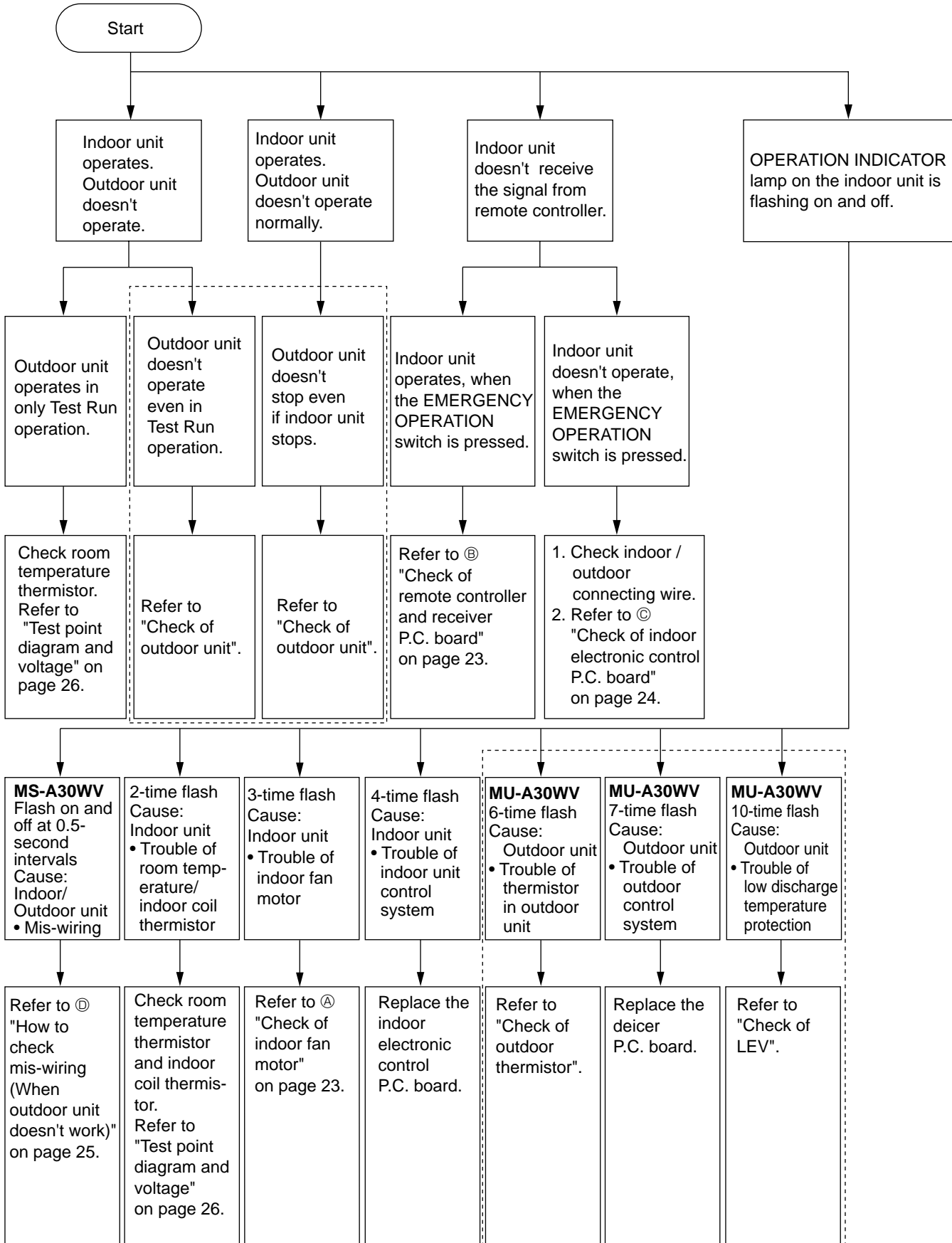
- ① Remove the front lid and insert batteries. Then reattach the front lid.

- ② Press the RESET button with tip end of ball point pen or the like, and then use the remote controller.



NOTE : If the RESET button is not pressed, the remote controller may not operate correctly.

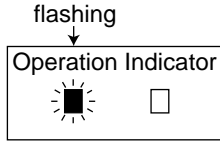
10-2. Instruction of troubleshooting



---: As for outdoor unit, refer to service manual OB326.

1. Troubleshooting check table

- The following indication applies regardless of shape of the indicator.



- Flashing of the OPERATION INDICATOR lamp (on the left-hand side) indicates possible abnormalities.
- The OPERATION INDICATOR lamp (on the left-hand side) is lighted during normal operation.

Before taking measures, make sure that the symptom reappears, for accurate troubleshooting.

Self check table

No.	Abnormal point	Operation indicator lamp	Symptom	Detection method	Checkpoint
1	MS-A30WV Mis-Wiring	0.5-second ON ●○●○●○●○ 0.5-second OFF	Outdoor unit does not operate.	3 minutes after power supply turns ON, when serial signal is not received.	• Refer to ㉔ "How to check mis-wiring" on page 25.
2	Indoor coil thermistor Room temperature thermistor	2-time flash ●○●○○○○○●○●○○○ 2.5-second OFF	Outdoor unit does not operate.	Detect Indoor coil/room temperature thermistor short or open circuit every 8 seconds during operation.	• Refer to the characteristics of main indoor coil thermistor, sub indoor coil thermistor, and room temperature thermistor on page 26.
3	Indoor fan motor	3-time flash ●○●○●○○○○○●○●○●○○○ 2.5-second OFF	Indoor fan repeats 12 seconds ON and 3minutes OFF. When the indoor fan breaks, the fan keeps stopping.	When rotational frequency feedback signal is not emitting during 12-second indoor fan operation.	• Refer to ㉔ "Check of indoor fan motor" on page 23.
4	Indoor control system	4-time flash ●○●○●○●○○○○○●○●○●○●○ 2.5-second OFF	Outdoor unit does not operate.	When it cannot properly read data in the nonvolatile memory of the indoor electronic control P.C. board.	• Check the indoor electronic control P.C. board.
5	MU-A30WV Outdoor thermistor	6-time flash ●○●○●○●○●○○○○○●○ 2.5-second OFF	Outdoor unit does not operate.	<Thermistor short> Thermistors are abnormal when they short after compressor start-up. <Thermistor open> Thermistors are abnormal when they open after compressor start-up. However, discharge temperature thermistor is abnormal when open circuit is detected more than 10 minutes after compressor start-up.	• Check the deicer P.C. board. • Reconnect the connector. Refer to "Check of outdoor thermistor". Refer to service manual OB326.
6	MU-A30WV Outdoor control system	7-time flash ●○●○●○●○●○●○○○○○●○ 2.5-second OFF	Outdoor unit does not operate.	When it cannot properly read data in the nonvolatile memory of the deicer P.C. board, outdoor unit stops.	• Check the deicer P.C. board. Refer to service manual OB326.
7	MU-A30WV Low discharge temperature protection	10-time flash ●○●○●○●○●○●○●○●○ 2.5-second OFF	Outdoor unit does not operate.	When discharge temperature has been 50°C or less on cool operation.	• Refer to "Check of LEV". • Check refrigerant circuit and refrigerant amount. Refer to service manual OB326.

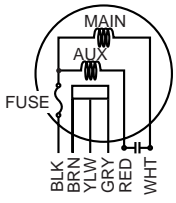
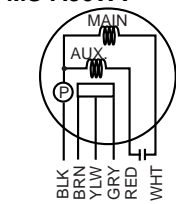
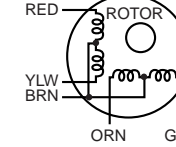
NOTE : When the indoor unit has started operation and the above detection method has detected an abnormality (the first detection after the power ON), the indoor electronic control P.C. board turns OFF the indoor fan motor with the OPERATION INDICATOR lamp flashing.

2. Trouble criterion of main parts

MS-A18WV -E1

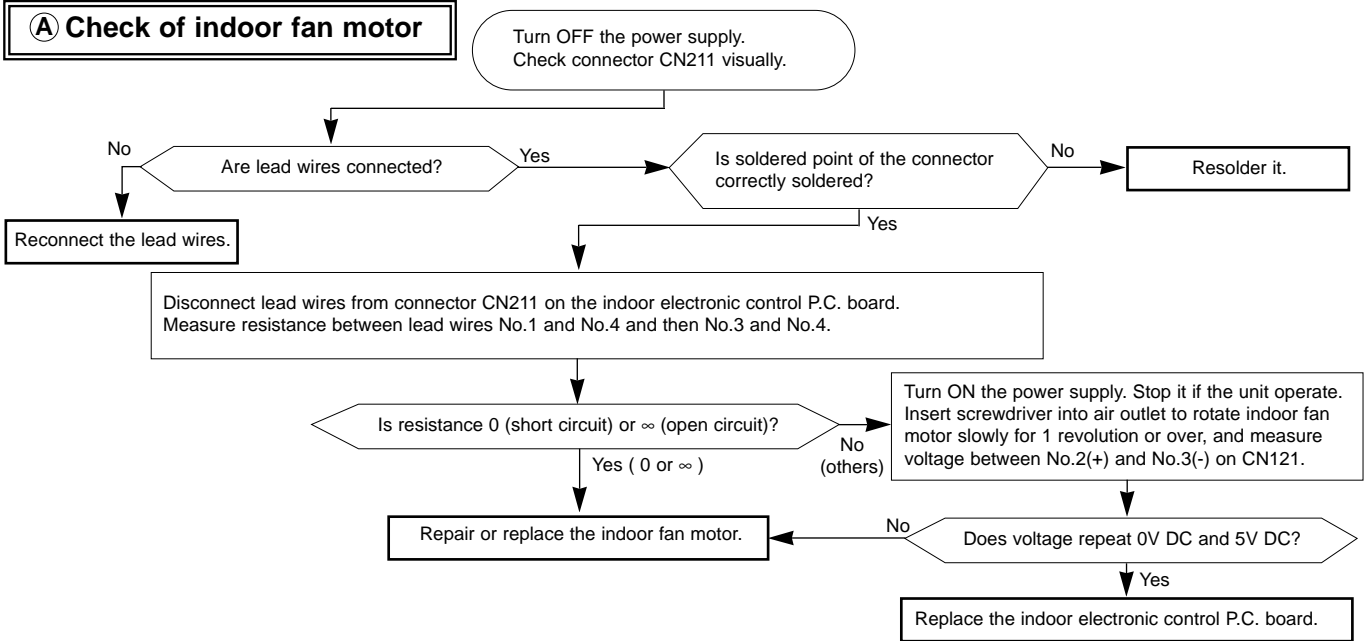
MS-A24WV -E1

MS-A30WV -E1

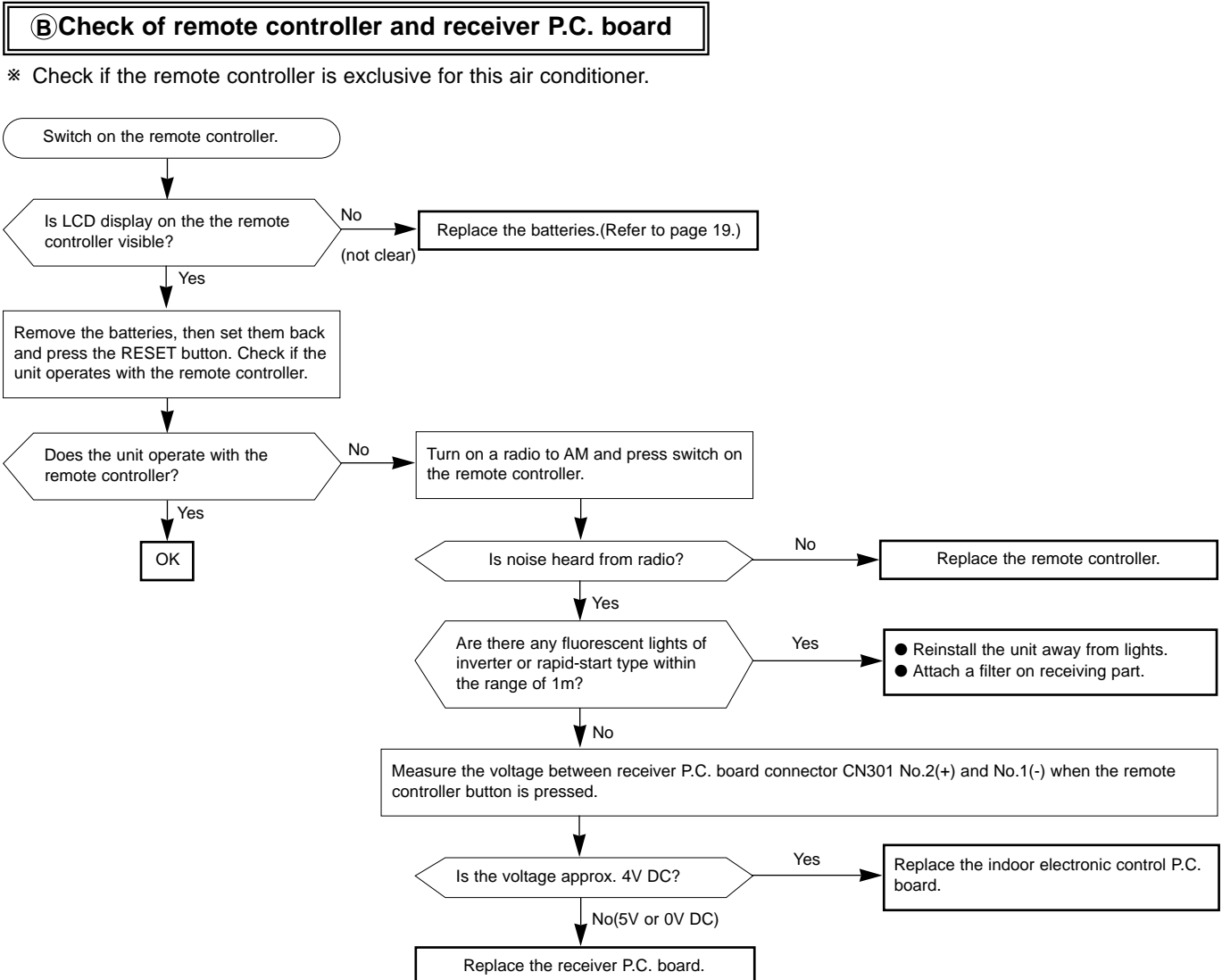
Part name	Check method and criterion	Figure													
Room temperature thermistor(RT11)	Measure the resistance with a tester. (Part temperature 10°C ~ 30°C)														
Indoor coil thermistor (RT12(main), RT13(sub))	<table border="1"> <thead> <tr> <th>Normal</th> <th>Abnormal</th> </tr> </thead> <tbody> <tr> <td>8 kΩ ~ 20 kΩ</td> <td>Open or short-circuit</td> </tr> </tbody> </table>		Normal	Abnormal	8 kΩ ~ 20 kΩ	Open or short-circuit									
Normal	Abnormal														
8 kΩ ~ 20 kΩ	Open or short-circuit														
Indoor fan motor(MF) MS-A18/A24WV INNER FUSE 145°C CUT OFF MS-A30WV INNER PROTECTOR 135± 5°C OPEN	<p>Motor part</p> <p>Measure the resistance between the terminals with a tester. (Part temperature 10°C ~ 30°C)</p> <table border="1"> <thead> <tr> <th rowspan="2">Color of lead wire</th> <th colspan="2">Normal</th> <th rowspan="2">Abnormal</th> </tr> <tr> <th>MS-A18/A24WV</th> <th>MS-A30WV</th> </tr> </thead> <tbody> <tr> <td>WHT – BLK</td> <td>282 Ω ~ 305 Ω</td> <td>133 Ω ~ 144 Ω</td> <td rowspan="2">Open or short-circuit</td> </tr> <tr> <td>BLK – RED</td> <td>141 Ω ~ 152 Ω</td> <td>152 Ω ~ 165 Ω</td> </tr> </tbody> </table>	Color of lead wire	Normal		Abnormal	MS-A18/A24WV	MS-A30WV	WHT – BLK	282 Ω ~ 305 Ω	133 Ω ~ 144 Ω	Open or short-circuit	BLK – RED	141 Ω ~ 152 Ω	152 Ω ~ 165 Ω	<p>MS-A18/A24WV</p> 
	Color of lead wire		Normal			Abnormal									
MS-A18/A24WV		MS-A30WV													
WHT – BLK	282 Ω ~ 305 Ω	133 Ω ~ 144 Ω	Open or short-circuit												
BLK – RED	141 Ω ~ 152 Ω	152 Ω ~ 165 Ω													
	<p>Sensor part</p> <p>Measure the voltage power ON.</p> <table border="1"> <thead> <tr> <th>Color of lead wire</th> <th>Normal</th> <th>Abnormal</th> </tr> </thead> <tbody> <tr> <td>BRN – YLW</td> <td>4.5 ~ 5.5V</td> <td rowspan="2">Remain 0V or 5V</td> </tr> <tr> <td>YLW – GRY</td> <td>(When fan revolved one time) 0V→5V→0V (Approx.)</td> </tr> </tbody> </table>	Color of lead wire	Normal	Abnormal	BRN – YLW	4.5 ~ 5.5V	Remain 0V or 5V	YLW – GRY	(When fan revolved one time) 0V→5V→0V (Approx.)	<p>MS-A30WV</p> 					
Color of lead wire	Normal	Abnormal													
BRN – YLW	4.5 ~ 5.5V	Remain 0V or 5V													
YLW – GRY	(When fan revolved one time) 0V→5V→0V (Approx.)														
Horizontal vane motor(MV1) Vertical vane motor(MV2)	<p>Measure the resistance between the terminal with a tester. (Part temperature 10°C ~ 30°C)</p> <table border="1"> <thead> <tr> <th>Normal</th> <th>Abnormal</th> </tr> </thead> <tbody> <tr> <td>282 Ω ~ 306 Ω</td> <td>Open or short-circuit</td> </tr> </tbody> </table>	Normal	Abnormal	282 Ω ~ 306 Ω	Open or short-circuit										
Normal	Abnormal														
282 Ω ~ 306 Ω	Open or short-circuit														

Ⓟ:INNER PROTECTOR

**When OPERATION INDICATOR lamp flashes 3-time.
Indoor fan motor doesn't operate.**

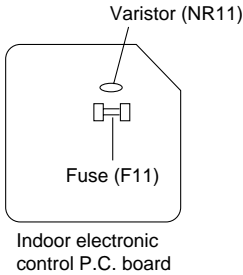
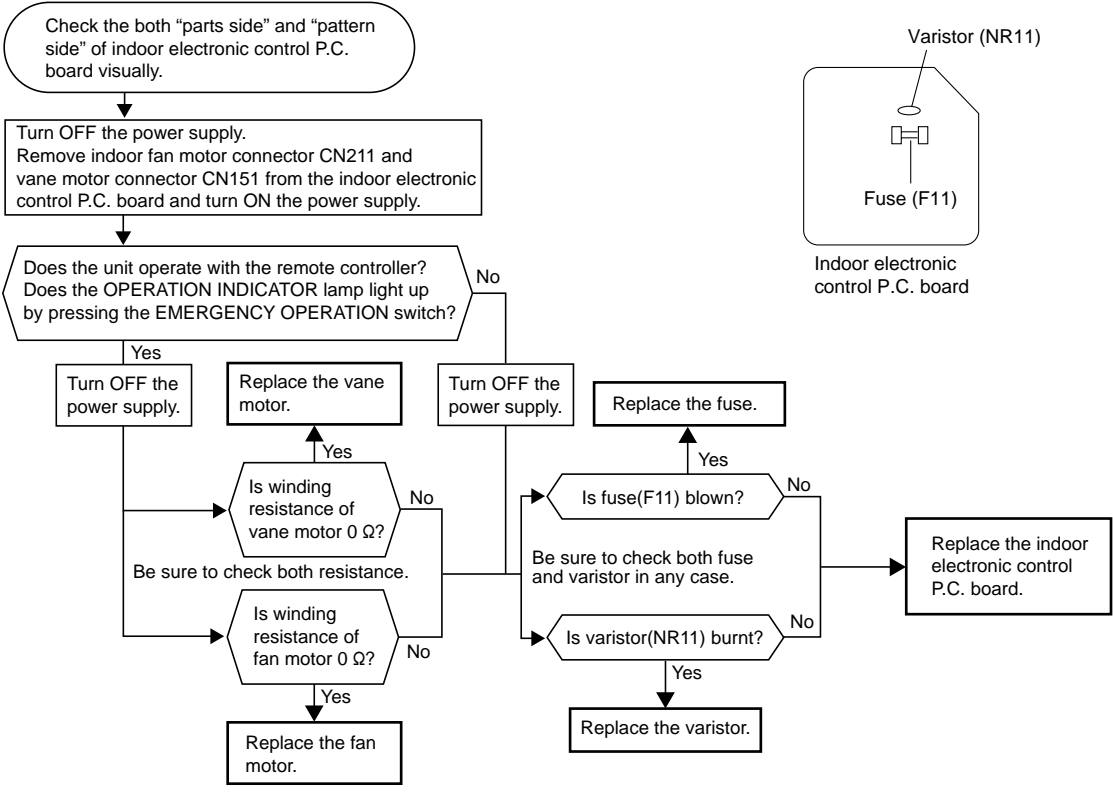


Indoor unit operates by pressing the EMERGENCY OPERATION switch, but doesn't operate with the remote controller.



The unit doesn't operate with the remote controller. Also, the OPERATION INDICATOR lamp doesn't light up by pressing the EMERGENCY OPERATION switch.

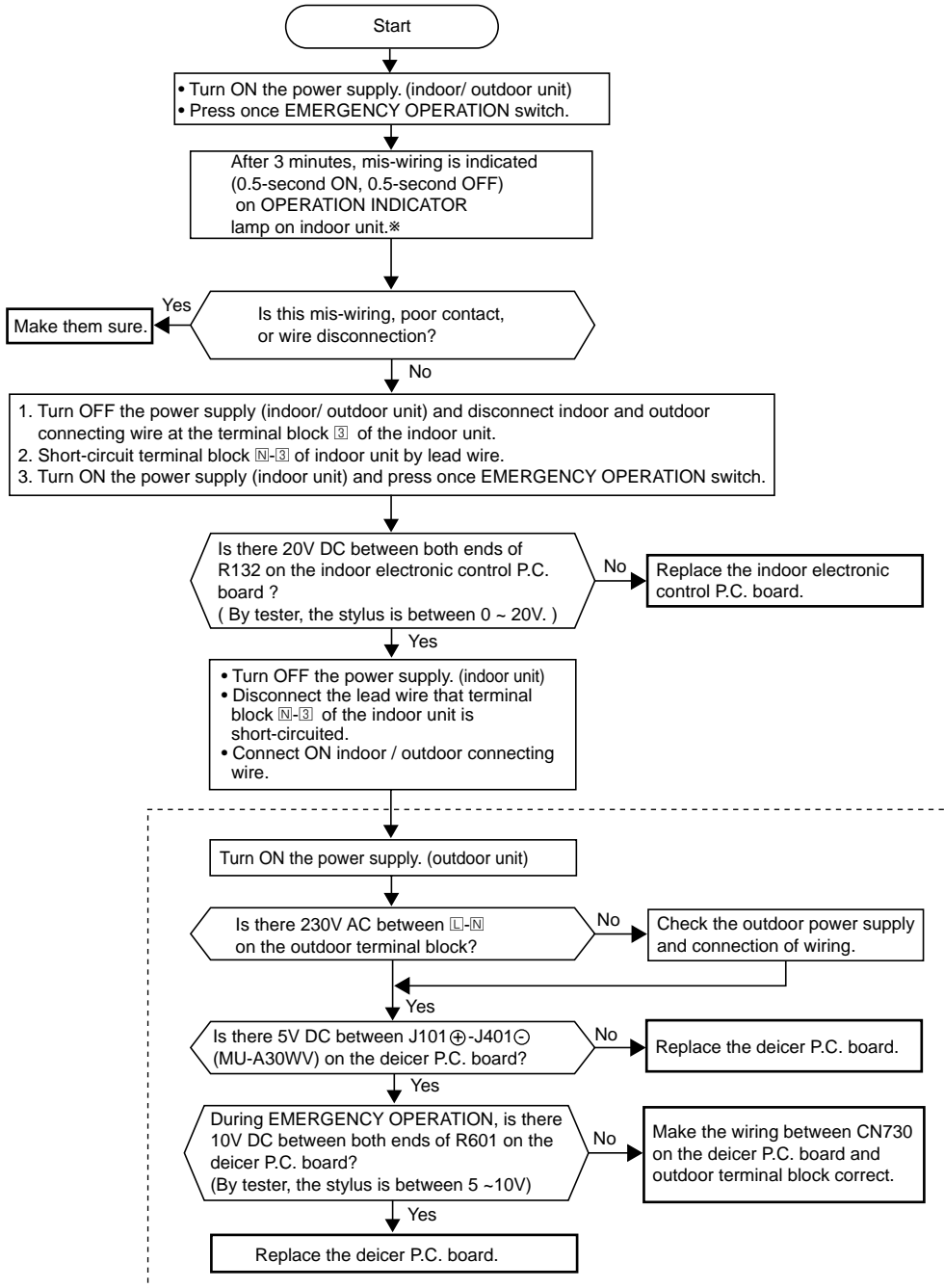
© Check of indoor electronic control P.C. board



When OPERATION INDICATOR lamp flashes ON and OFF in every 0.5-second.
Outdoor unit doesn't operate.

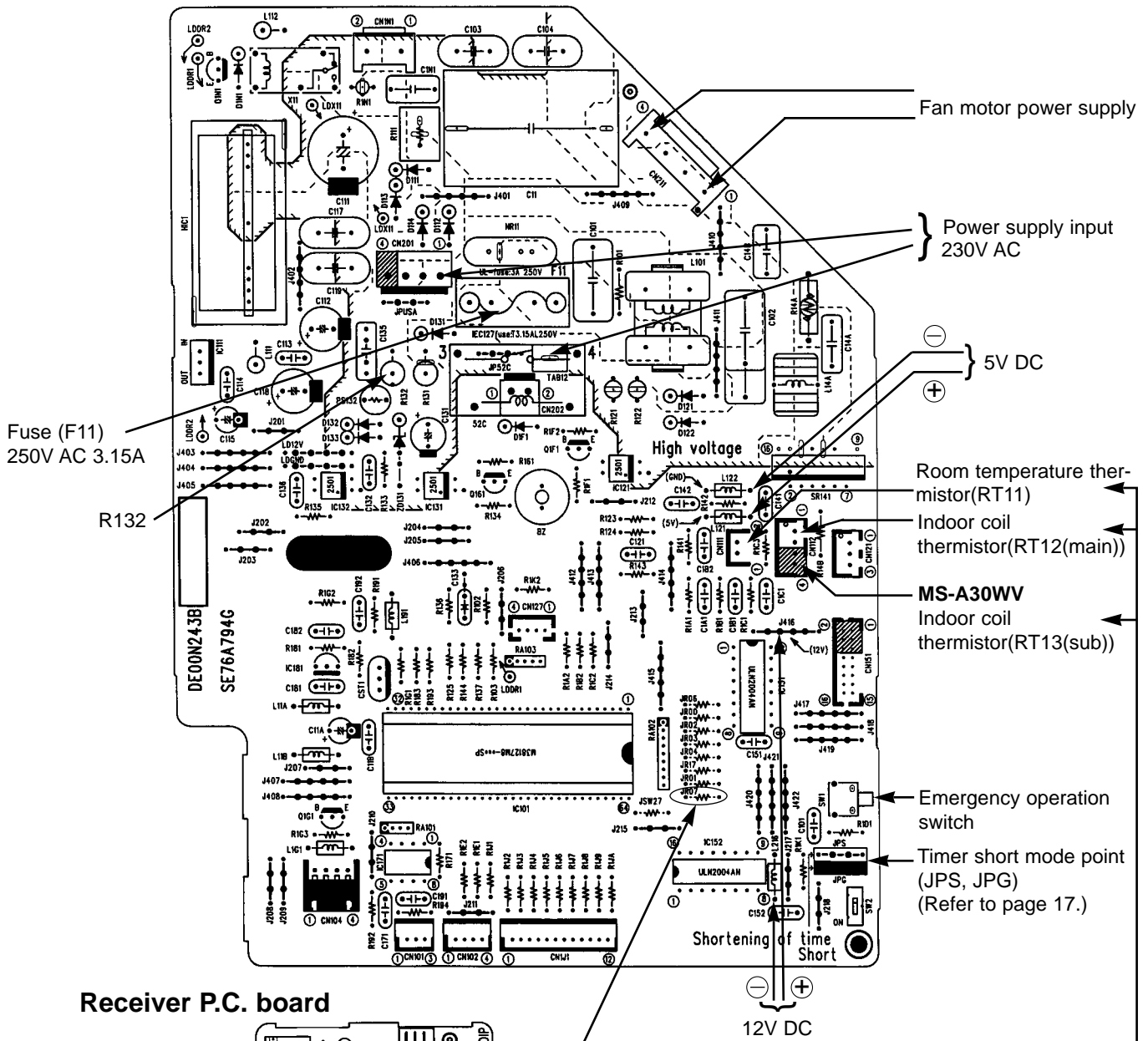
D How to check mis-wiring MS-A30WV

* Short circuit of JPG and JPS on the indoor electronic control P.C. board enables self-check to be displayed in 3 seconds.

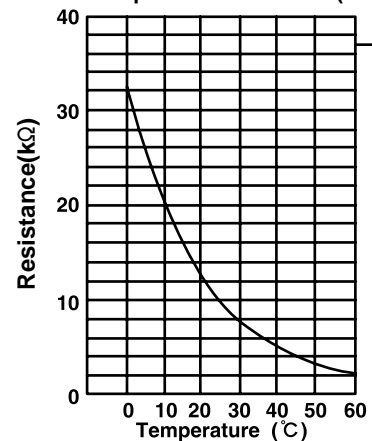


As for outdoor unit, refer to service manual OB326.

TEST POINT DIAGRAM AND VOLTAGE
MS-A18WV -E1 MS-A24WV -E1 MS-A30WV -E1
Indoor electronic control P.C. board



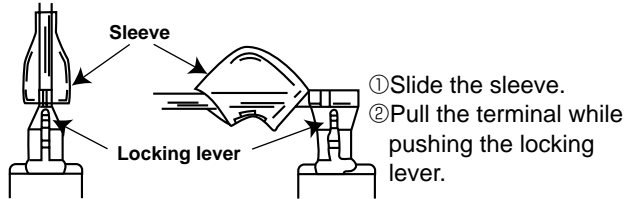
**Indoor coil thermistor (RT12(main), RT13(sub))
 Room temperature thermistor (RT11)**



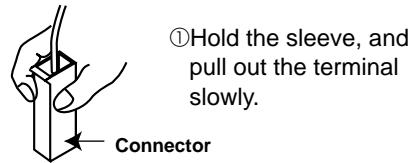
<"Terminal with lock mechanism" Detaching points>

In case of terminal with lock mechanism, detach the terminal as shown below.
There are two types (Refer to (1) and (2)) of the terminal with lock mechanism.
The terminal with no lock mechanism can be removed by pulling it out.
Check the shape of the terminal and work.

(1) Slide the sleeve and check if there is a locking lever or not.



(2) The terminal with this connector is a terminal with lock mechanism



MS-A18WV -[E1] MS-A24WV -[E1] MS-A30WV -[E1]
INDOOR UNIT

OPERATING PROCEDURE	PHOTOS
<p>1. Removing the front panel</p> <p>(1) Remove the screw caps of the front panel. Remove the screws.</p> <p>(2) Pull the panel down to your side slightly and unhook the catches at the top.</p>	<p>Photo 1</p> <p>Front panel</p> <p>Screws</p>
<p>2. Removing the electronic control P.C. board, the receiver P.C. board and the display P.C. board</p> <p>(1) Remove the front panel. (Refer to 1.)</p> <p>(2) Remove the screw of the electrical cover. Remove the electrical cover.</p> <p>(3) Remove the screws of the V.A. clamp. Remove the V.A. clamp.</p> <p>(4) Remove the screw of the terminal block.</p> <p>(5) Remove the screws of the ground wire.</p> <p>(6) Disconnect all the connectors and all the lead wires on the electronic control P.C. board.</p> <p>(7) Remove the R.L holder.</p> <p>(8) Remove the electronic control P.C. board.</p> <p>(9) Open the R.L holder, remove the receiver P.C. board and the display P.C. board.</p>	<p>Photo 2</p> <p>Screws of the ground wire</p> <p>Fan motor connectors</p> <p>Vane motor connector</p> <p>Indoor electronic control P.C. board</p> <p>Screw of the electrical cover</p> <p>R.L holder</p> <p>Screw of the terminal block</p> <p>Receiver P.C. board</p> <p>Screw of the V.A. clamp</p>

OPERATING PROCEDURE

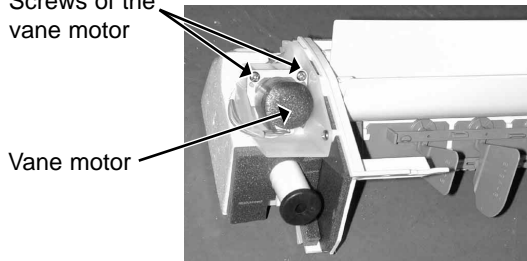
3. Removing the electrical box

- (1) Remove the front panel. (Refer to 1.)
- (2) Remove the electrical cover. (Refer to 2.)
- (3) Disconnect the connector of the indoor coil thermistor.
- (4) Disconnect the motor connector (CN211 and CN121) and the vane motor connector (CN151) on the electronic control P.C. board.
- (5) Remove the screws of ground wire.
- (6) Remove the fan motor lead wire and indoor coil thermistor from the electrical box.
- (7) Remove the lead wire of vane motor from the bottom of electrical box.
- (8) Remove the screw fixing the electrical box and remove the electrical box.

4. Removing the vane motor

- (1) Remove the front panel. (Refer to 1.)
- (2) Remove the electrical cover. (Refer to 2.)
- (3) Remove the lead wire of vane motor. (Refer to 3.)
- (4) Remove the R.L. holder.
- (5) Pull out the drain hose from the nozzle assembly and remove the nozzle assembly.
- (6) Remove the screws of the vane motor and disconnect the connector.
- (7) Remove the vane motor.

Photo 5 Screws of the vane motor



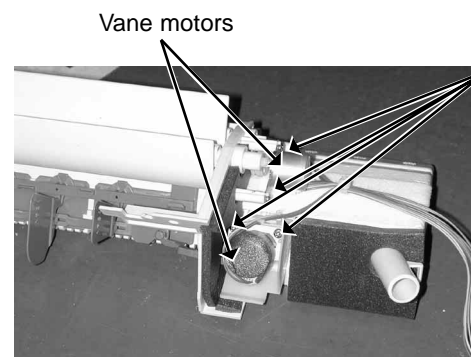
PHOTOS

Photo 3 Screws of the ground wire



Screw of the electrical cover
Screw of the electrical box

Photo 4



Vane motors

Screws of the vane motor

5. Removing the line flow fan and the indoor fan motor

- (1) Remove the front panel. (Refer to 1.)
- (2) Remove the electrical box. (Refer to 3.)
- (3) Pull out the drain hose from the nozzle assembly and remove the nozzle assembly.
- (4) Remove the water cut.
- (5) Slide the hole cover and remove the hole cover.
- (6) Remove the hexagon socket set screw from the line flow fan.
- (7) Remove the screws fixing the fan motor and remove the fan motor. (Be careful not to drop the fan motor because it is heavy.)
- (8) Remove the screws fixing the left side of the heat exchanger.
- (9) Lift the left side of the heat exchanger.
- (10) Remove the line flow fan.

Photo 8

Hole cover

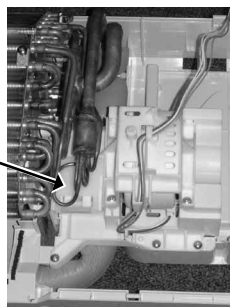


Photo 6

Screws fixing the left side of the heat exchanger

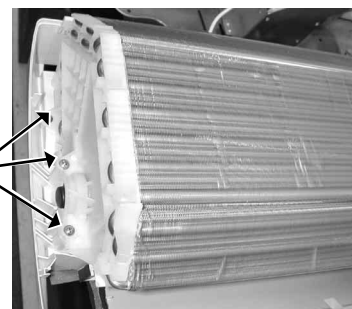
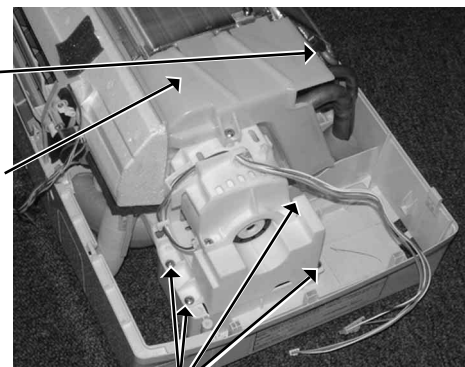


Photo 7

Indoor coil thermistor
Water cut



Screws fixing the fan motor

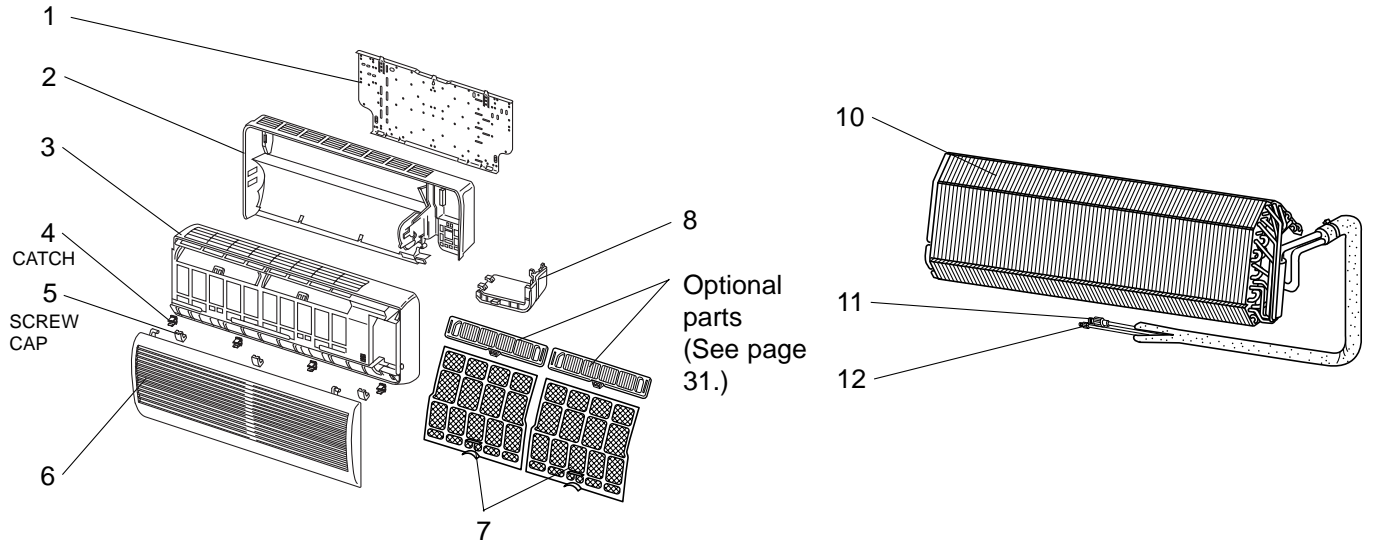
MS-A18WV -E1 (WH)

MS-A24WV -E1 (WH)

MS-A30WV -E1 (WH)

12-1. INDOOR UNIT STRUCTURAL PARTS

12-2. INDOOR UNIT HEAT EXCHANGER



12-1. INDOOR UNIT STRUCTURAL PARTS

Part number that is circled is not shown in the illustration.

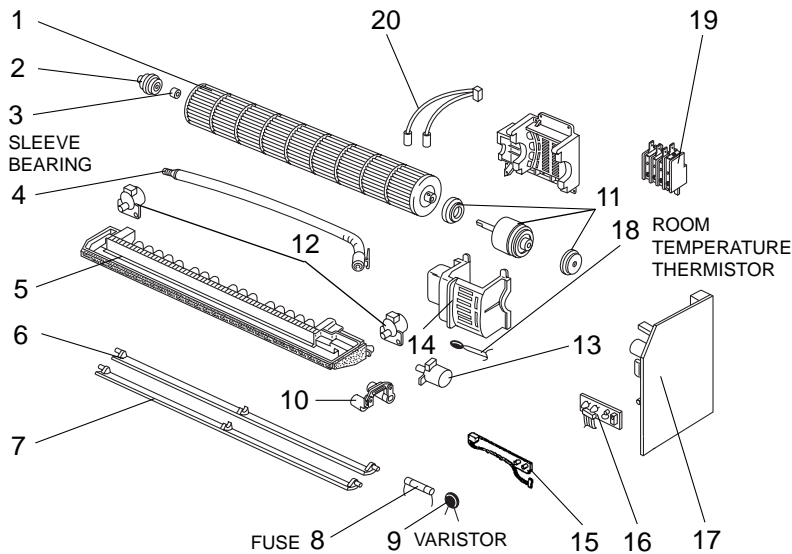
No.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit			Remarks
				MS-A18 WV - E1 (WH)	MS-A24 WV - E1 (WH)	MS-A30 WV - E1 (WH)	
1	E02 527 970	INSTALLATION PLATE		1	1	1	
2	E02 527 234	BOX (WH)		1	1	1	
3	E02 527 000	FRONT PANEL ASSEMBLY(WH)		1	1	1	Including No.4,5,6
4	E02 408 142	CATCH		4	4	4	4PCS/ SET
5	E02 527 067	SCREW CAP (WH)		3	3	3	3PCS/ SET
6	E02 527 010	GRILLE (WH)		1	1	1	
7	E02 534 100	CATECHIN AIR FILTER		2	2	2	
8	E02 527 975	CORNER BOX RIGHT		1	1	1	
⑨	E02 528 007	LAMP PANEL		1	1	1	

12-2. INDOOR UNIT HEAT EXCHANGER

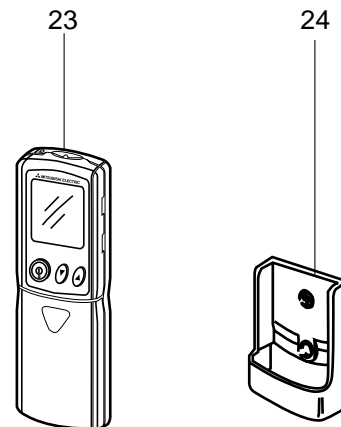
10	E02 817 620	INDOOR HEAT EXCHANGER		1	1		
	E02 819 620	INDOOR HEAT EXCHANGER				1	
11	E02 179 667	UNION (GAS)		1			φ12.7
	E02 138 666	UNION (GAS)			1	1	φ15.88
12	E02 151 667	UNION (LIQUID)		1	1		φ6.35
	E02 527 667	UNION (LIQUID)				1	φ9.52

MS-A18WV -E1 (WH)
 MS-A24WV -E1 (WH)
 MS-A30WV -E1 (WH)

12-3. INDOOR UNIT FUNCTIONAL PARTS AND ELECTRICAL PARTS



12-4. ACCESSORY AND REMOTE CONTROLLER



12-3. INDOOR UNIT FUNCTIONAL PARTS AND ELECTRICAL PARTS

Part numbers that are circled are not shown in the illustration.

No.	Part No.	Part Name	Symbol in Wiring Diagram	Q'ty/unit			Remarks
				MS-A18 WV - E1 (WH)	MS-A24 WV - E1 (WH)	MS-A30 WV - E1 (WH)	
1	E02 527 302	LINE FLOW FAN		1	1	1	
2	E02 408 509	BEARING MOUNT		1	1	1	
3	E02 001 504	SLEEVE BEARING		1	1	1	
4	E02 408 702	DRAIN HOSE		1	1	1	
5	E02 527 235	NOZZLE (WH)		1	1	1	
6	E02 527 040	VANE UPPER (WH)		1	1	1	
7	E02 527 041	VANE LOWER (WH)		1	1	1	
8	E02 127 382	FUSE	F11	1	1	1	3.15A
9	E02 817 385	VARISTOR	NR11	1	1	1	
10	E02 527 034	VANE CRANK SET		1	1	1	
11	E02 817 300	INDOOR FAN MOTOR ASSEMBLY	MF	1	1		RC4V32 - □□ including RUBBER MOUNT
	E02 527 300	INDOOR FAN MOTOR ASSEMBLY	MF			1	RC4V40 - □□ including RUBBER MOUNT
12	E02 448 303	VANE MOTOR (VERTICAL)	MV2	2	2	2	RIGHT & LEFT
13	E02 408 303	VANE MOTOR (HORIZONTAL)	MV1	1	1	1	UP & DOWN
14	E02 817 333	MOTOR BAND		1	1		
	E02 527 333	MOTOR BAND				1	
15	E02 528 329	DISPLAY P.C. BOARD		1	1	1	
16	E02 527 468	RECEIVER P.C. BOARD		1	1	1	
17	E02 817 452	ELECTRONIC CONTROL P.C. BOARD		1			AUTO RESTART Including No.16
	E02 818 452	ELECTRONIC CONTROL P.C. BOARD			1		AUTO RESTART Including No.16
	E02 819 452	ELECTRONIC CONTROL P.C. BOARD				1	AUTO RESTART Including No.16
18	E02 527 308	ROOM TEMPERATURE THERMISTOR	RT11	1	1	1	
19	E02 817 375	TERMINAL BLOCK	TB	1	1		
	E02 819 375	TERMINAL BLOCK	TB			1	
20	E02 408 311	INDOOR COIL THERMISTOR	RT12	1	1		
	E02 527 307	INDOOR COIL THERMISTOR	RT12, RT13			1	
21	E02 528 034	VANE MOTOR SUPPORT SET(RIGHT)		1	1	1	
22	E02 529 034	VANE MOTOR SUPPORT SET(LEFT)		1	1	1	

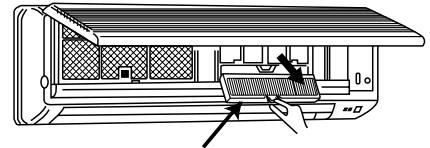
12-4. ACCESSORY AND REMOTE CONTROLLER

23	E02 527 426	REMOTE CONTROLLER		1	1	1	
24	E02 527 083	REMOTE CONTROLLER HOLDER		1	1	1	

AIR CLEANING FILTER

- AIR CLEANING FILTER removes fine dust of 0.01 micron from air by means of static electricity.
- Normal life of AIR CLEANING FILTER is 4 months. However, when it becomes dirty, replace it as soon as possible.
- Clogged AIR CLEANING FILTER may reduce the air conditioner capacity or cause frost on the air outlet.
- DO NOT reuse AIR CLEANING FILTER even if it is washed.
- DO NOT remove or attach AIR CLEANING FILTER during unit operation.

Model	Part No.
MS-A18WV- E1	MAC-1700FT
MS-A24WV- E1	
MS-A30WV- E1	



Air cleaning filter (White bellows type)



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